Hydrologic Report

for the

Proposed Residential Redevelopment

located at

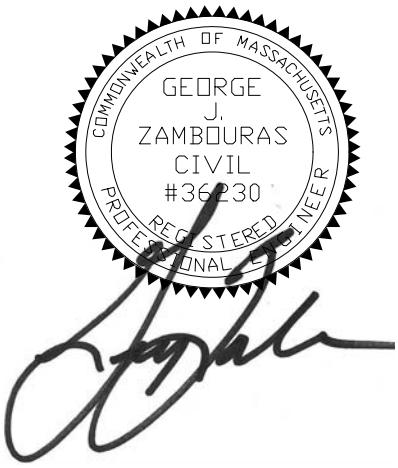
28 Lake Attitash Road

Amesbury, Massachusetts 01913

Prepared For

George & Kelly Norwood
18 Campion Road
North Andover, MA 01845

2, 10 & 100 Year Storm
24 Hour Duration



Date: April 5, 2016
Rev. May 23, 2016

Atlantic Engineering & Survey Consultants Inc.
97 Tenney Street, Georgetown, Massachusetts 01833
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TABLE OF CONTENTS

I. INTRODUCTION
II. EXISTING CONDITIONS
III. PROPOSED CONDITIONS
IV. SITE SOILS
V. SITE DRAINAGE and STORMWATER COMPNENTS
VI. SUMMARY
VII. ASSUMPTIONS AND DESIGN CRITERIA
VIII. PRE-DEVELOPMENT CALCULATIONS
IX. POST-DEVELOPMENT CALCULATIONS

INTRODUCTION:

This report describes the pre and post hydraulic analysis and stormwater management measures to be implemented to mitigate the potential impacts to the environment and surrounding properties for the redevelopment of a single family dwelling on a parcel of land located at 28 Lake Attitash Road – Amesbury, Massachusetts.

The proposed redevelopment being a single family dwelling is except from DEP stormwater standards but no stormwater recharge; however this report is being prepared to address the Special Permit requirements within the Water Resources Protection District of the Town of Amesbury Zoning Regulations.

The pre and post hydraulic analysis and design of the proposed stormwater components are based on the hydraulic analysis performed utilizing "HydroCAD Storm water Modeling Software" for storm events of 2, 10 and 100-year storm frequencies.

EXISTING CONDITIONS:

The project site consists of an 8,298 s.f. parcel of land located on the easterly side of Lake Attitash Road and bounded by Lake Attitash to the east and residential properties to the north and south.
The site is a fully developed residential parcel containing an existing residential dwelling and shed.

PROPOSED CONDITIONS:

It is the intent of the property owner to demolish the existing structures and construct a new residential dwelling and garage. To assist in minimizing stormwater runoff the proposed driveway, patio and all walkways will be constructed of pervious pavers.

Additionally to mitigate the impacts of the added impervious surfaces and to comply with the Special Permit requirements all roof runoff will be directed to infiltration systems and an infiltration trench will be installed along a portion f the northerly property line to capture and infiltrate overland flow.

SITE SOILS:

The existing soils within the site are classified by NRCS as being of the Walpole soil group. Walpole soils are poorly drained sandy loams and belong to the hydrologic soil group B\D. Based on the soil tests performed the soils indicated by NRCS are inaccurate.

Three Soil Tests were performed and all soils were found to be sandy loams with underlying sands. For the purposes of pre and post site comparison all soils in this report have been identified as belong to the hydrologic soil group B. All exfiltration rates used are based on the

Rawls Rate of 1.02 Inches \ Hour for sandy loams as identified in DEP Stormwater Management Standards.

SITE DRAIANGE and STORMWATER COMPNENTS:

Presently stormwater runoff flows across the parcel in a northwesterly direction. The proposed site design will enable the post development drainage patterns to mimic the pre-development patterns.

In accordance with the Special Permit *requirements any site alteration that increases the impervious area must provide a compensatory stormwater management area of at least 150% of the increase in impervious area*. To meet this requirement roof infiltration and storage units and proposed for all roof surfaces and an infiltration trench is provided to capture overland flow.

Pre-development impervious areas:

Driveway	715 s.f.
Concrete Slab	34 s.f.
Shed	160 s.f..
Existing Dwelling	637 s.f.
Existing Porch	358 s.f.
Existing Impervious Total	1,904 s.f.

Post-development impervious areas:

Proposed Dwelling	1,560 s.f.
Proposed Garage	576 s.f.
Proposed Retaining Wall	45 s.f.
Proposed Impervious Total	2,181 s.f.

Net increase impervious area = 277 s.f.
Required compensatory stormwater management area = 277 x150% = 415.5 s.f.

Proposed Stormwater components:

Roof Infiltration Units – Infiltrator Systems Inc. Quick4 ISI 12" Chambers
These units will be installed in "Pairs" embedded in a crushed stone bed. The stone bedding will extend beyond the width and length of the chambers by 18-inches.
The effective bottom area of each pair of chambers to be 11' x 6.0' = 66 s.f.

Infiltration Trench - One infiltration trench is proposed along a portion of the northerly property line. The trench dimensions are: 45' x 1.5'= 67.5 s.f.

Compensatory stormwater management area provided:

Roof Infiltration Units Provided:
Garage Roof – 2 Pairs of infiltration chambers = 2 x 66 s.f. = 132 s.f.
Dwelling Roof – 4 Pairs of infiltration chambers = 4 x 66 s.f. = 264 s.f.

Infiltration Trench Provided = 67.5 s.f.

Total Compensatory Stormwater Management Area Provided = 463.5 s.f. > 415.5 s.f.

SUMMARY:

As indicated in the summary below the proposed stormwater components enables the post-development the stormwater runoff flow rates and volumes to be less than pre-development runoff flow rates and volumes for all storm modeled.

Hydraulic Analysis Summary

Single Family Residential Development – 28 Lake Attitash Road

Summary of Discharge Flows and Volumes to Northerly Design Point				
Design Storm	***Max. Discharge (CFS.)***	***Max. Discharge (CFS.)***	***Max. Volume (CU-FT.)***	***Max. Volume (CU-FT.)***
	Pre-Development.	***Post-Development***	***Pre-Development.***	***Post-Development***
2 Yr.	***0.14***	***0.07***	***519***	***284***
10 Yr.	***0.35***	***0.20***	***1,134***	***727***
100 Yr.	***0.69***	***0.57***	***2,183***	***1,656***

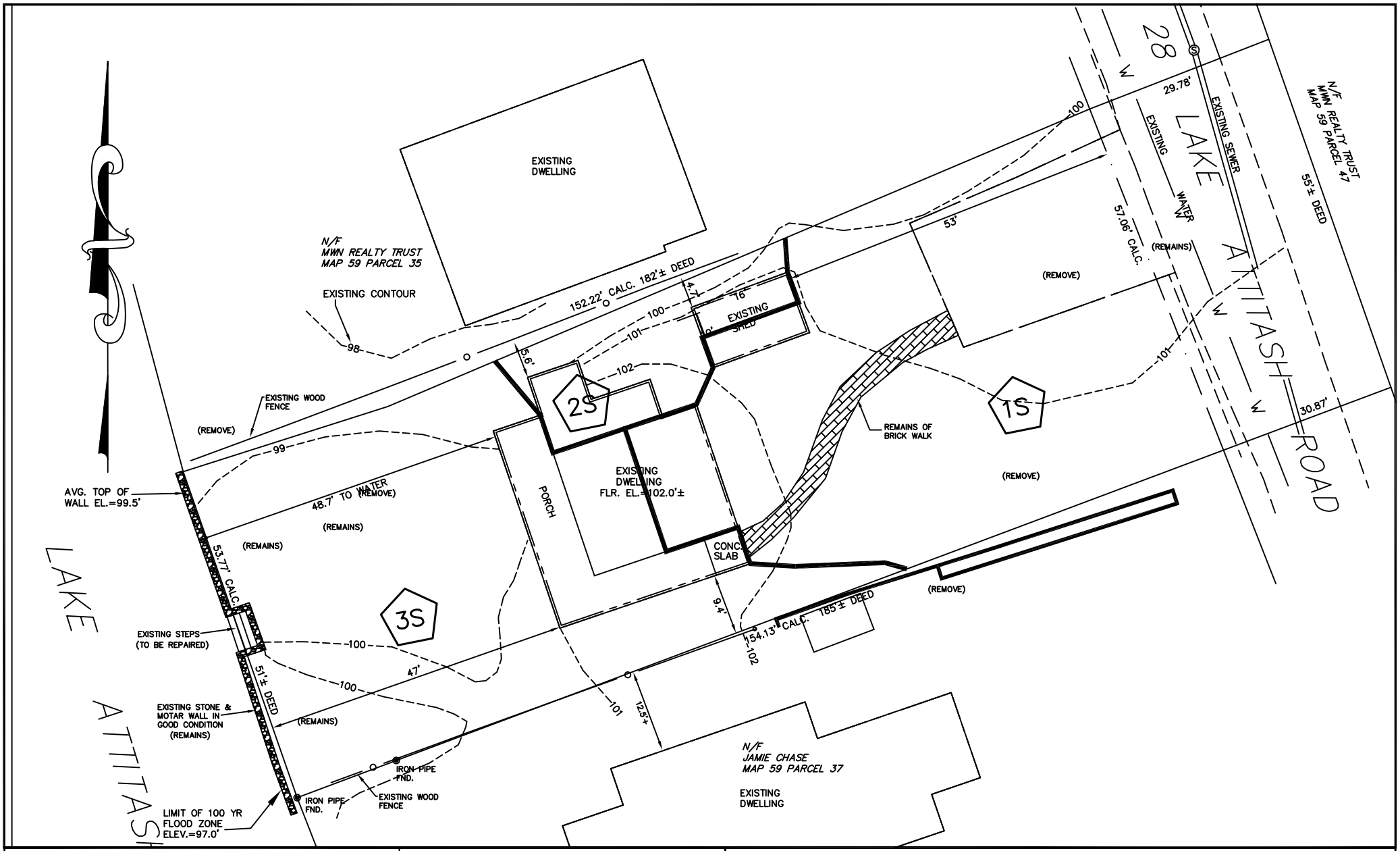
Assumptions:

The following assumptions are being used for design purposes:

1) ***2, 10 & 100 year storm frequency.***
2) ***24 hour storm duration (min.)***
3) ***Hydrologic soils groups for runoff areas are classified class as "B" soils.***
4) ***Existing and proposed Cn values are as noted in the report.***
5) ***Within small drainage areas a minimum Tc value of 6 min. is used.***

Design Criteria:

1) ***Runoff quantities are calculated using TR-20 intensity numbers***
2) ***I = 3.1 for 2 yr / 24 hr. duration , 4.5 in./10 yr. & 6.5 in./100 yr.***
3) ***Proposed Cn values are as noted in the report.***
4) ***Hyetograph shape = S.C.S. III (eastern U.S.)***
5) ***The maximum flow rate of run-off for the 2, 25 & 100 yr. design storms which are routed through drainage system will be equal or less than pre-development runoff.***



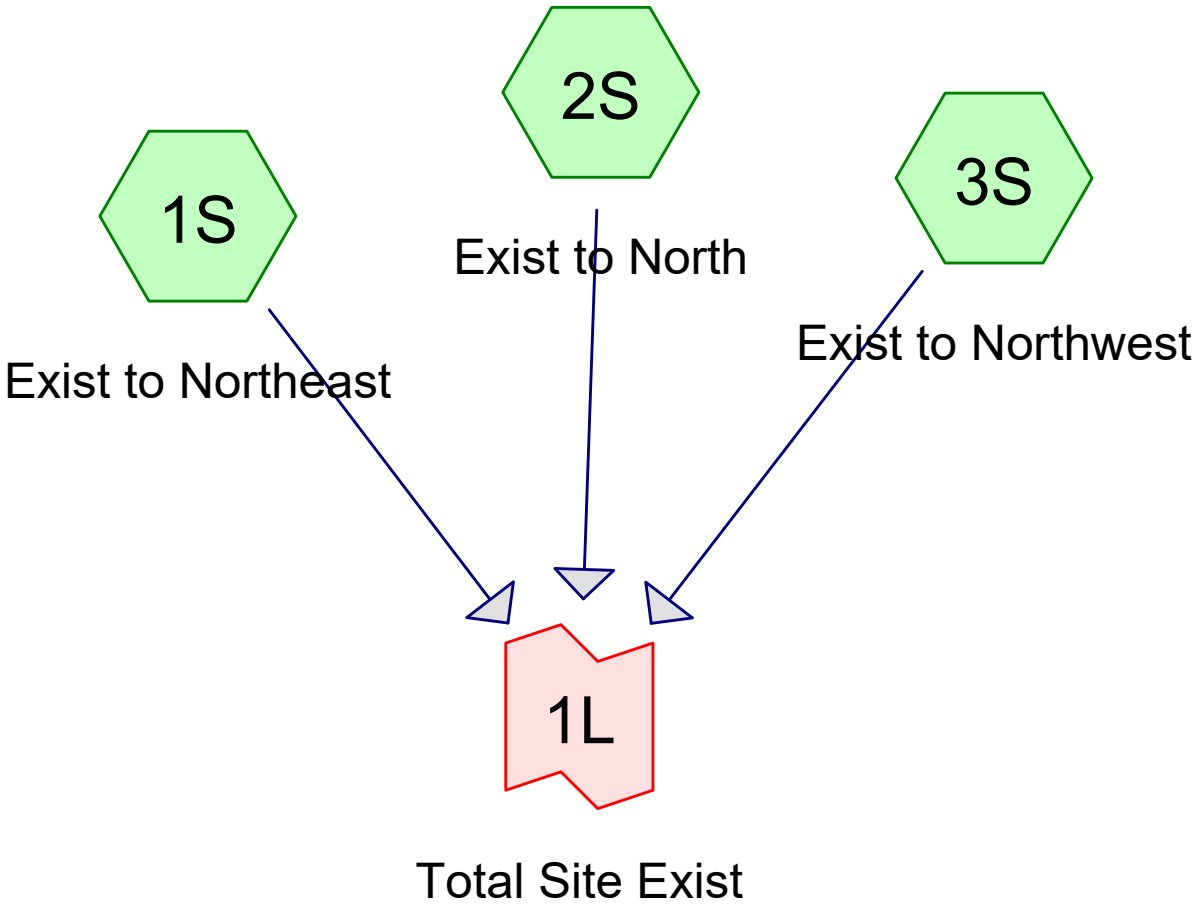
DATE: MAY 23, 2016

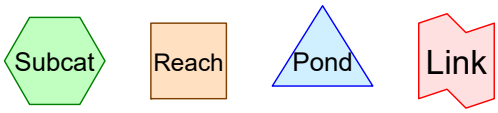
SCALE = NTS

PRE-DEVELOPMENT WATERSHED PERMIT PLAN

28 LAKE ATTITASH ROAD
AMESBURY, MASSACHUSETTS

ATLANTIC ENGINEERING & SURVEY CONSULTANTS INC.
97 TENNEY STREET – – GEORGETOWN, MA 01833
PHONE: 978-352-7870 FAX: 978-352-9940





Routing Diagram for Attitash-Rev_052216
Prepared by George J. Zambouras, P.E.
HydroCAD® 10.00 s/n 05086 © 2012 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
6,394	61	>75% Grass cover, Good, HSG B (1S, 2S, 3S)
715	98	Paved parking, HSG B (1S)
1,155	98	Roofs, HSG B (1S, 2S, 3S)
34	98	Unconnected pavement, HSG B (3S)
8,298	**69**	**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Exist to Northeast Runoff Area=4,020 sf 25.75% Impervious Runoff Depth>0.82"
Tc=6.0 min CN=71 Runoff=0.08 cfs 274 cf

Subcatchment 2S: Exist to North Runoff Area=663 sf 36.35% Impervious Runoff Depth>0.97"
Tc=6.0 min CN=74 Runoff=0.02 cfs 54 cf

Subcatchment 3S: Exist to Northwest Runoff Area=3,615 sf 17.37% Impervious Runoff Depth>0.63"
Tc=6.0 min CN=67 Runoff=0.05 cfs 191 cf

Link 1L: Total Site Exist Inflow=0.14 cfs 519 cf
Primary=0.14 cfs 519 cf

Total Runoff Area = 8,298 sf Runoff Volume = 519 cf Average Runoff Depth = 0.75"
77.05% Pervious = 6,394 sf 22.95% Impervious = 1,904 sf

Summary for Subcatchment 1S: Exist to Northeast

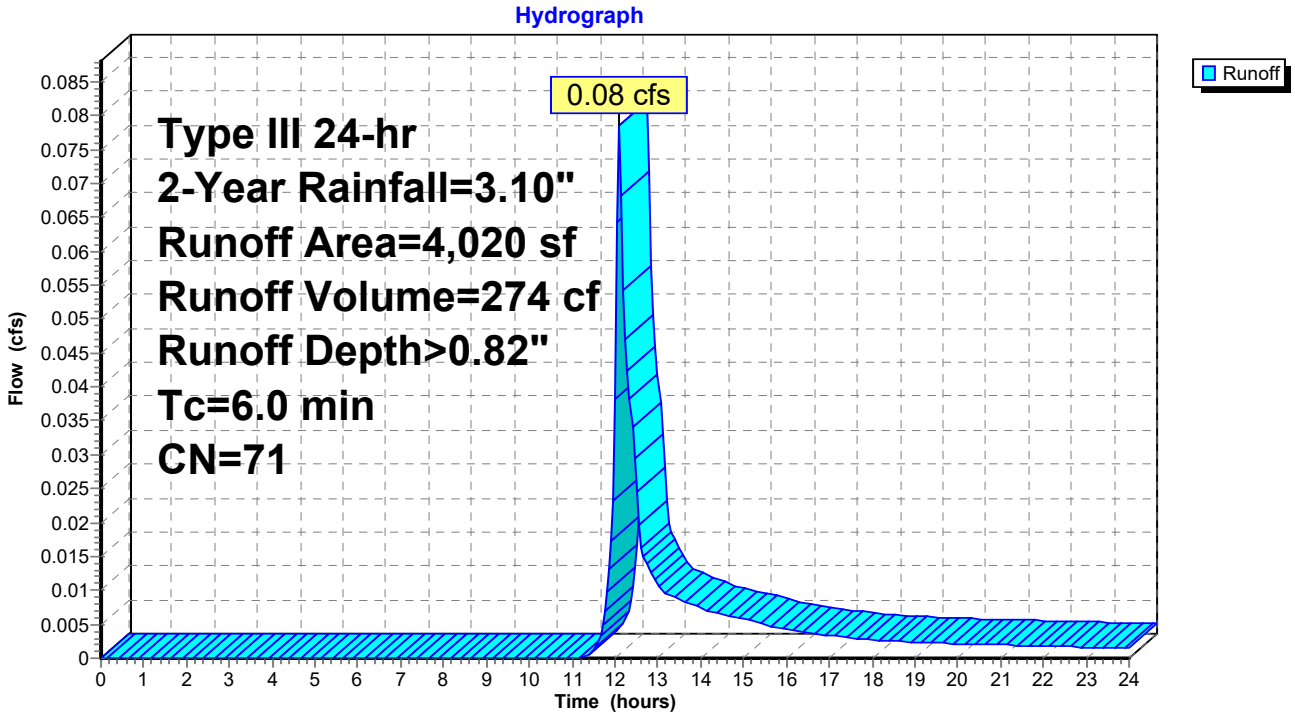
Runoff = 0.08 cfs @ 12.10 hrs, Volume= 274 cf, Depth> 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
2,985	61	>75% Grass cover, Good, HSG B
320	98	Roofs, HSG B
715	98	Paved parking, HSG B
4,020	71	Weighted Average
2,985		74.25% Pervious Area
1,035		25.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 1S: Exist to Northeast



Summary for Subcatchment 2S: Exist to North

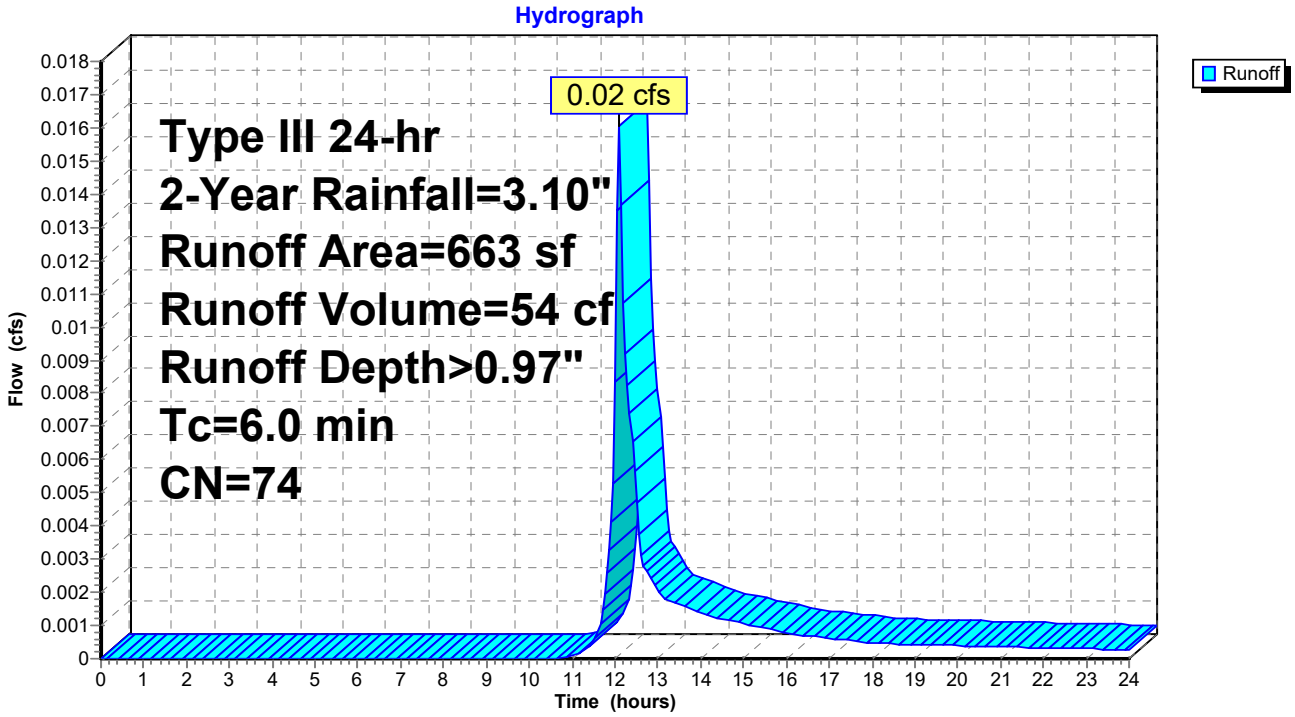
Runoff = 0.02 cfs @ 12.10 hrs, Volume= 54 cf, Depth> 0.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
422	61	>75% Grass cover, Good, HSG B
241	98	Roofs, HSG B
663	74	Weighted Average
422		63.65% Pervious Area
241		36.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 2S: Exist to North



Summary for Subcatchment 3S: Exist to Northwest

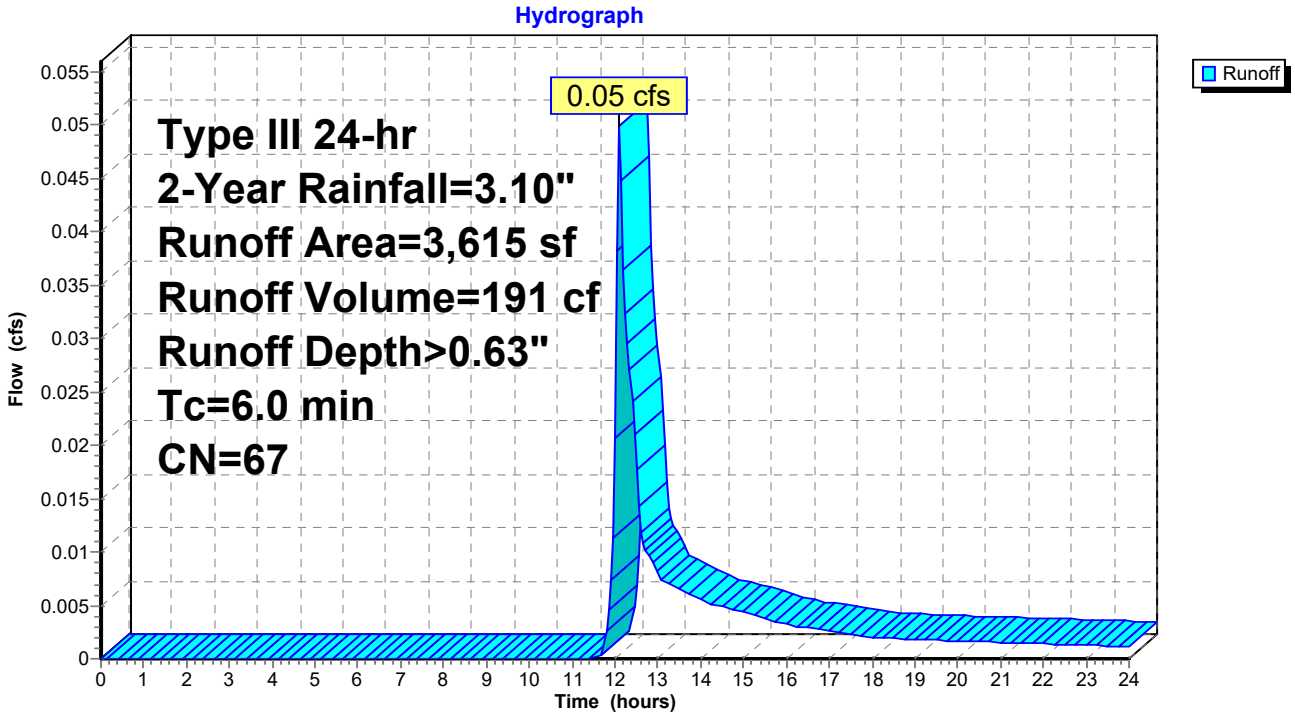
Runoff = 0.05 cfs @ 12.11 hrs, Volume= 191 cf, Depth> 0.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
2,987	61	>75% Grass cover, Good, HSG B
594	98	Roofs, HSG B
34	98	Unconnected pavement, HSG B
3,615	67	Weighted Average
2,987		82.63% Pervious Area
628		17.37% Impervious Area
34		5.41% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 3S: Exist to Northwest

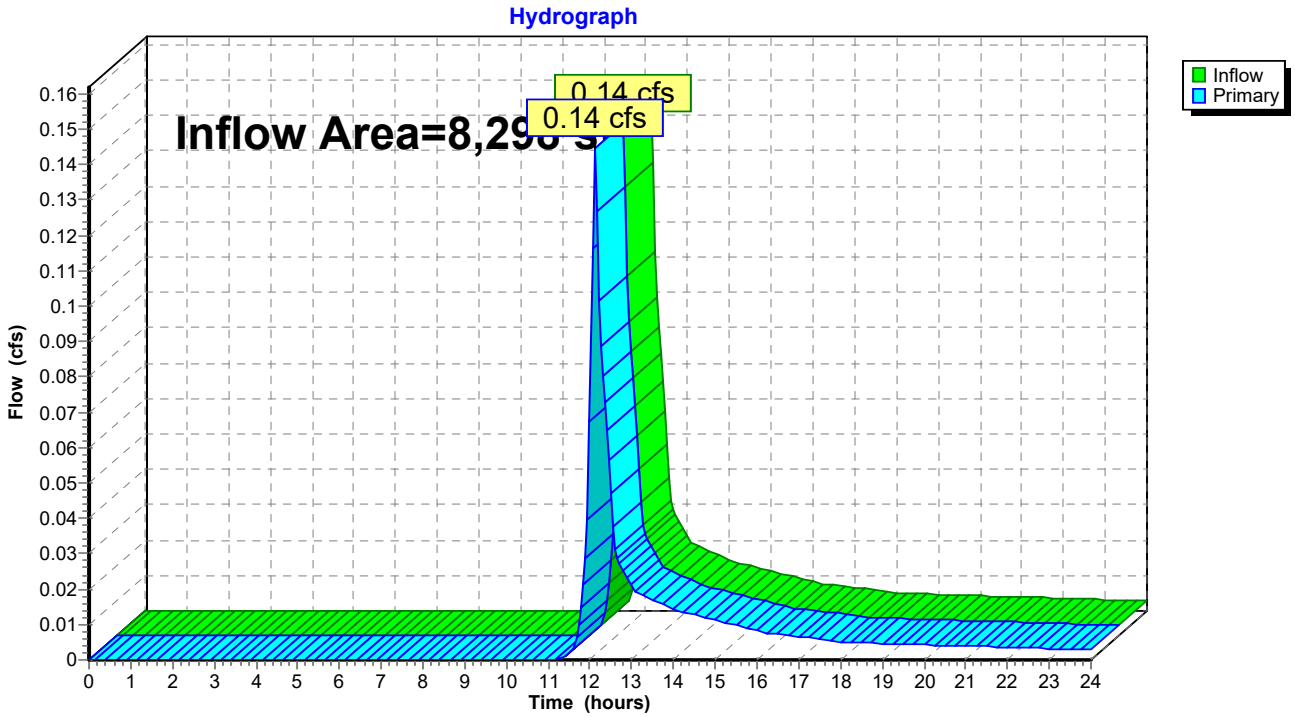


Summary for Link 1L: Total Site Exist

Inflow Area = 8,298 sf, 22.95% Impervious, Inflow Depth > 0.75" for 2-Year event
Inflow = 0.14 cfs @ 12.11 hrs, Volume= 519 cf
Primary = 0.14 cfs @ 12.11 hrs, Volume= 519 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Total Site Exist



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Exist to Northeast Runoff Area=4,020 sf 25.75% Impervious Runoff Depth>1.74"
Tc=6.0 min CN=71 Runoff=0.18 cfs 584 cf

Subcatchment 2S: Exist to North Runoff Area=663 sf 36.35% Impervious Runoff Depth>1.97"
Tc=6.0 min CN=74 Runoff=0.03 cfs 109 cf

Subcatchment 3S: Exist to Northwest Runoff Area=3,615 sf 17.37% Impervious Runoff Depth>1.46"
Tc=6.0 min CN=67 Runoff=0.13 cfs 440 cf

Link 1L: Total Site Exist Inflow=0.35 cfs 1,134 cf
Primary=0.35 cfs 1,134 cf

Total Runoff Area = 8,298 sf Runoff Volume = 1,134 cf Average Runoff Depth = 1.64"
77.05% Pervious = 6,394 sf 22.95% Impervious = 1,904 sf

Summary for Subcatchment 1S: Exist to Northeast

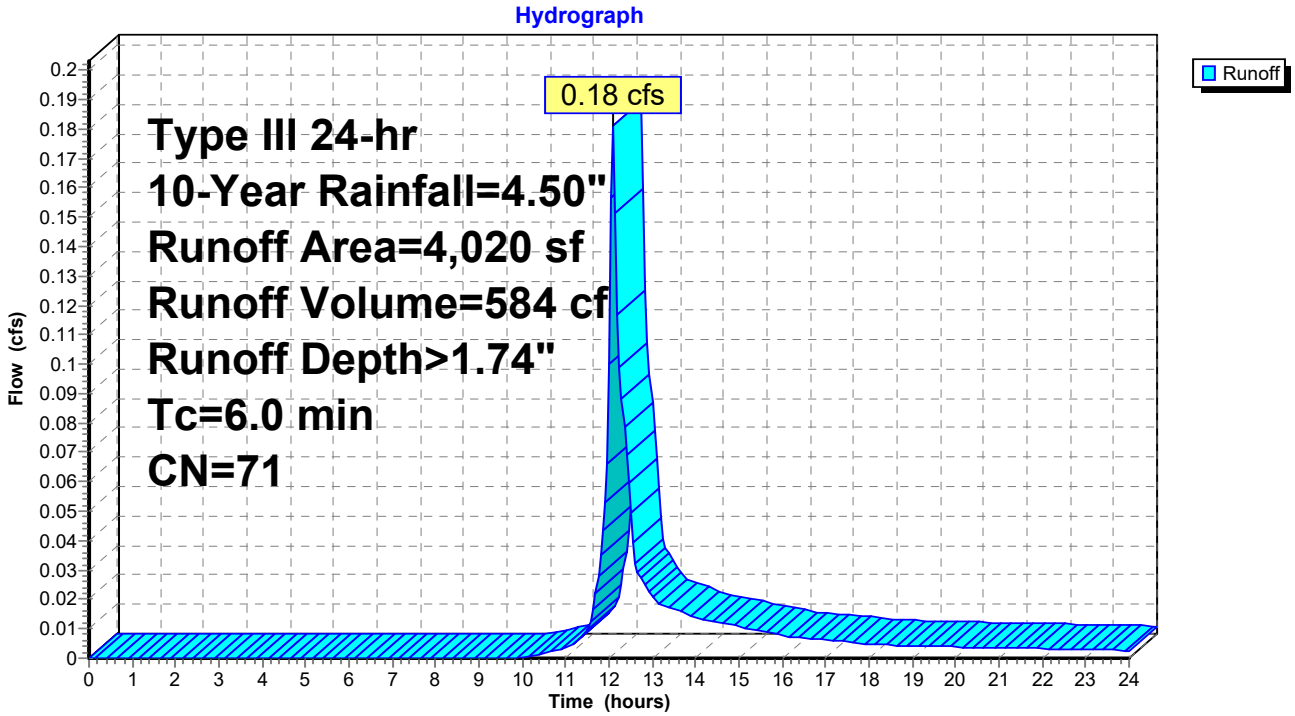
Runoff = 0.18 cfs @ 12.10 hrs, Volume= 584 cf, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
2,985	61	>75% Grass cover, Good, HSG B
320	98	Roofs, HSG B
715	98	Paved parking, HSG B
4,020	71	Weighted Average
2,985		74.25% Pervious Area
1,035		25.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 1S: Exist to Northeast



Summary for Subcatchment 2S: Exist to North

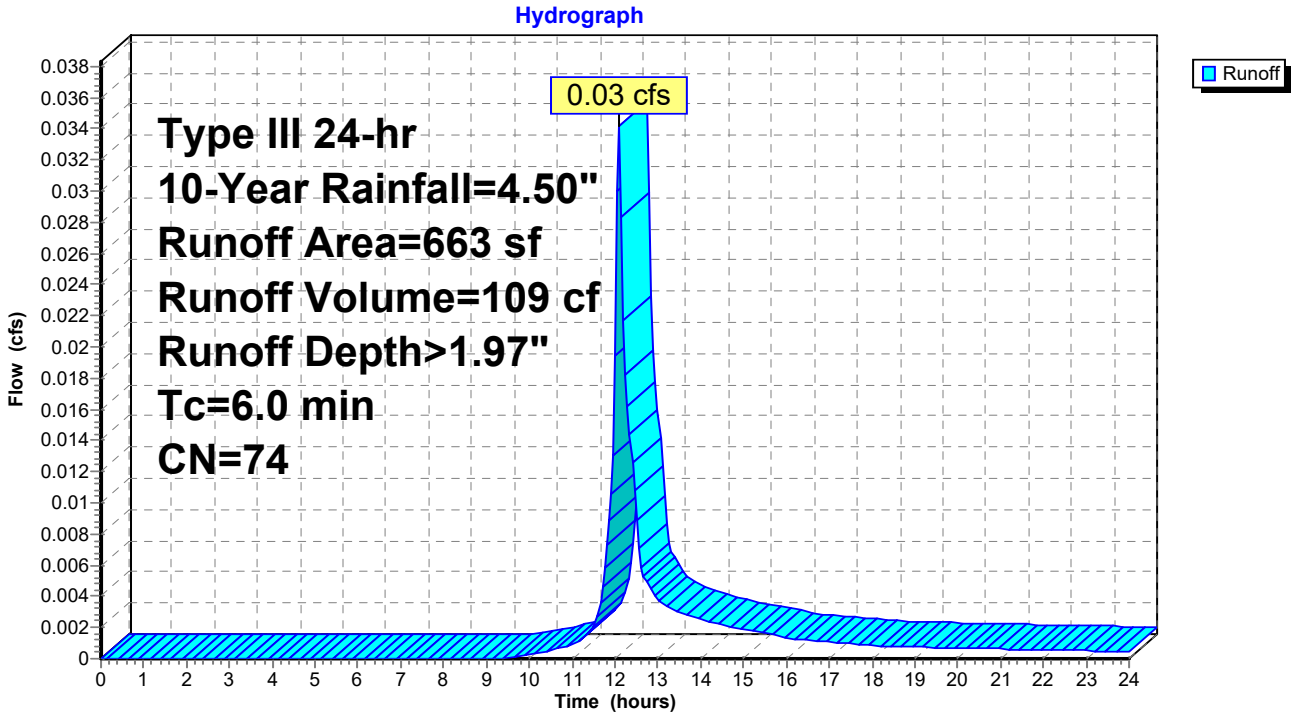
Runoff = 0.03 cfs @ 12.10 hrs, Volume= 109 cf, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
422	61	>75% Grass cover, Good, HSG B
241	98	Roofs, HSG B
663	74	Weighted Average
422		63.65% Pervious Area
241		36.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 2S: Exist to North



Summary for Subcatchment 3S: Exist to Northwest

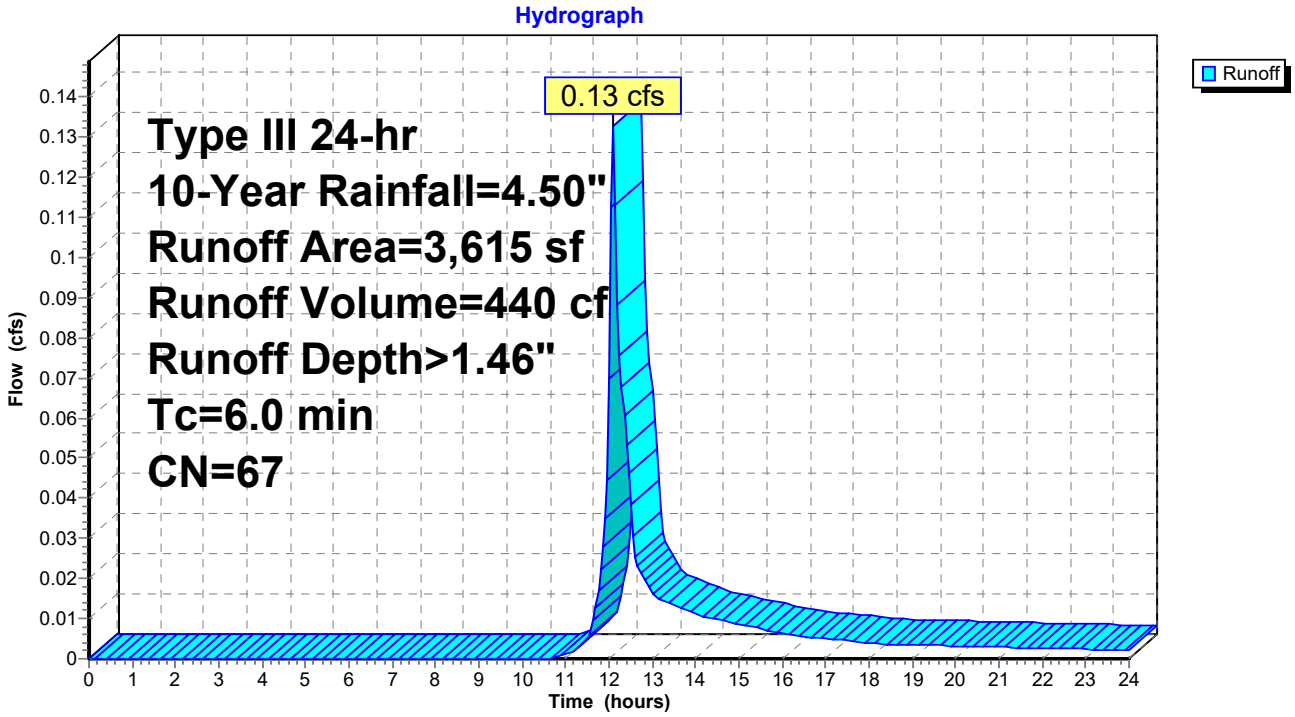
Runoff = 0.13 cfs @ 12.10 hrs, Volume= 440 cf, Depth> 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
2,987	61	>75% Grass cover, Good, HSG B
594	98	Roofs, HSG B
34	98	Unconnected pavement, HSG B
3,615	67	Weighted Average
2,987		82.63% Pervious Area
628		17.37% Impervious Area
34		5.41% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 3S: Exist to Northwest

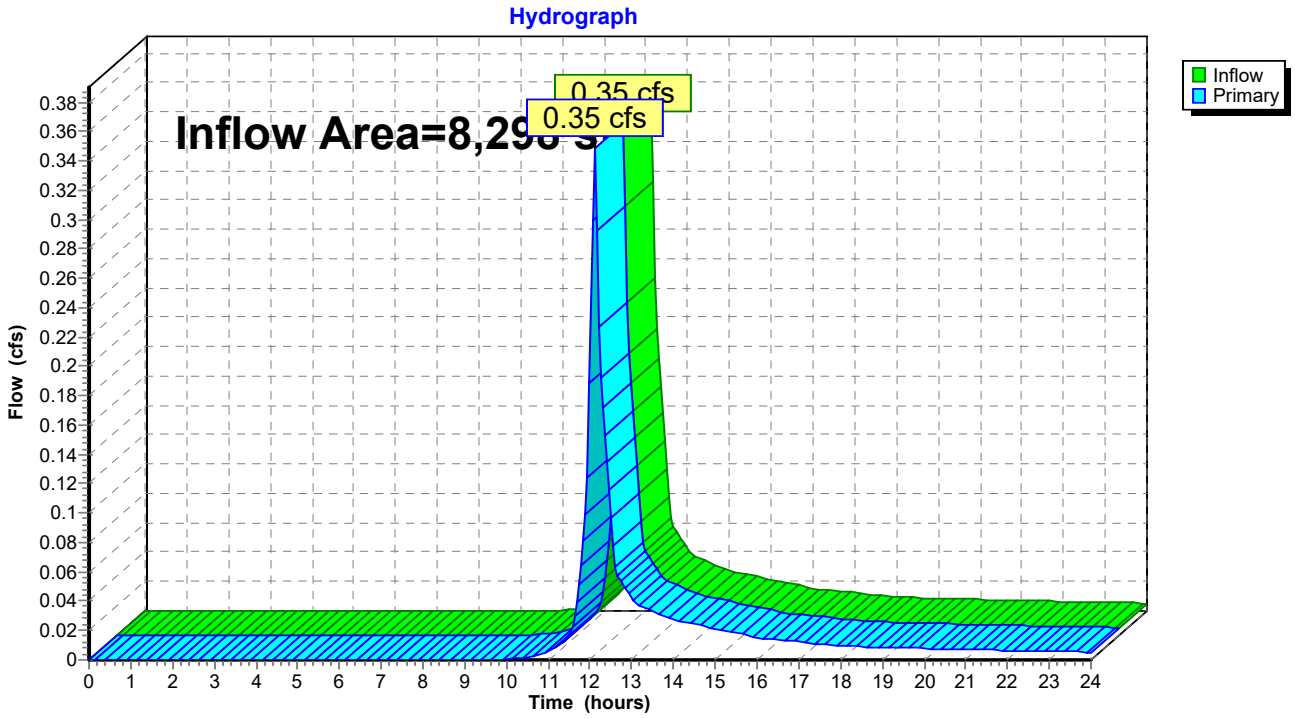


Summary for Link 1L: Total Site Exist

Inflow Area = 8,298 sf, 22.95% Impervious, Inflow Depth > 1.64" for 10-Year event
Inflow = 0.35 cfs @ 12.10 hrs, Volume= 1,134 cf
Primary = 0.35 cfs @ 12.10 hrs, Volume= 1,134 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Total Site Exist



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Exist to Northeast Runoff Area=4,020 sf 25.75% Impervious Runoff Depth>3.30"
Tc=6.0 min CN=71 Runoff=0.35 cfs 1,107 cf

Subcatchment 2S: Exist to North Runoff Area=663 sf 36.35% Impervious Runoff Depth>3.61"
Tc=6.0 min CN=74 Runoff=0.06 cfs 199 cf

Subcatchment 3S: Exist to Northwest Runoff Area=3,615 sf 17.37% Impervious Runoff Depth>2.91"
Tc=6.0 min CN=67 Runoff=0.28 cfs 877 cf

Link 1L: Total Site Exist Inflow=0.69 cfs 2,183 cf
Primary=0.69 cfs 2,183 cf

Total Runoff Area = 8,298 sf Runoff Volume = 2,183 cf Average Runoff Depth = 3.16"
77.05% Pervious = 6,394 sf 22.95% Impervious = 1,904 sf

Summary for Subcatchment 1S: Exist to Northeast

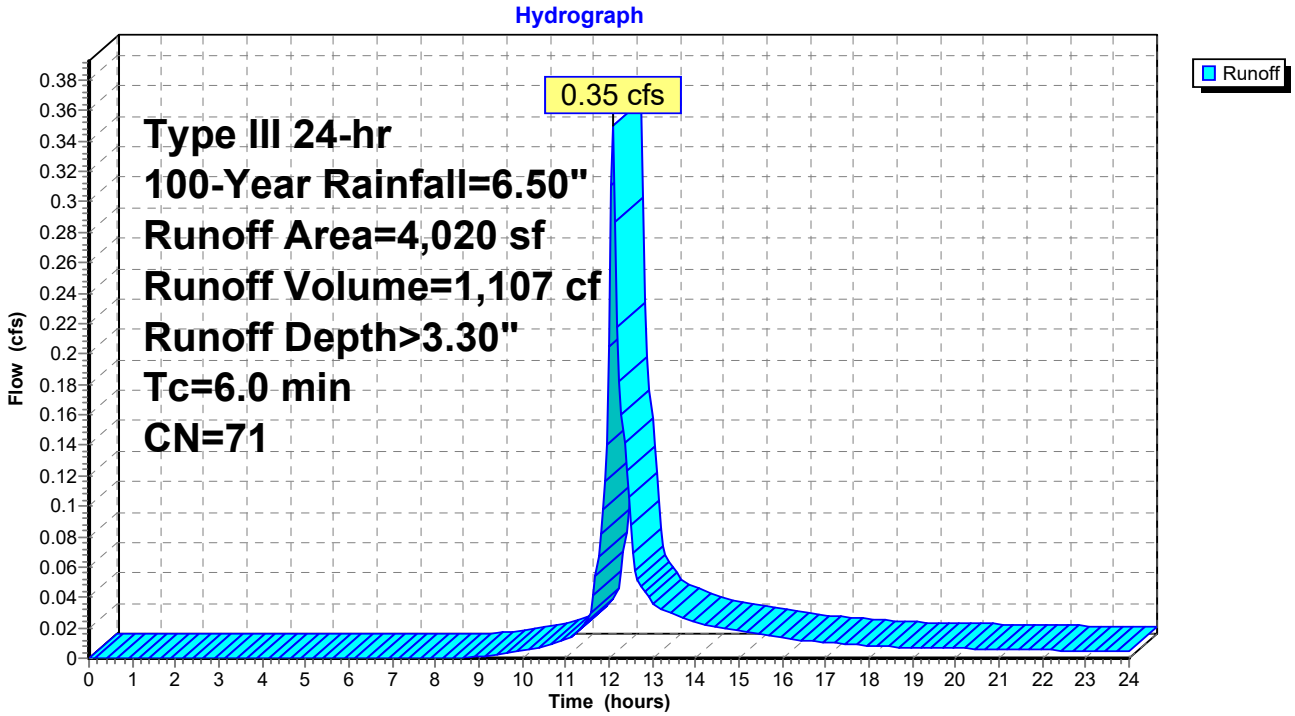
Runoff = 0.35 cfs @ 12.09 hrs, Volume= 1,107 cf, Depth> 3.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
2,985	61	>75% Grass cover, Good, HSG B
320	98	Roofs, HSG B
715	98	Paved parking, HSG B
4,020	71	Weighted Average
2,985		74.25% Pervious Area
1,035		25.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 1S: Exist to Northeast



Summary for Subcatchment 2S: Exist to North

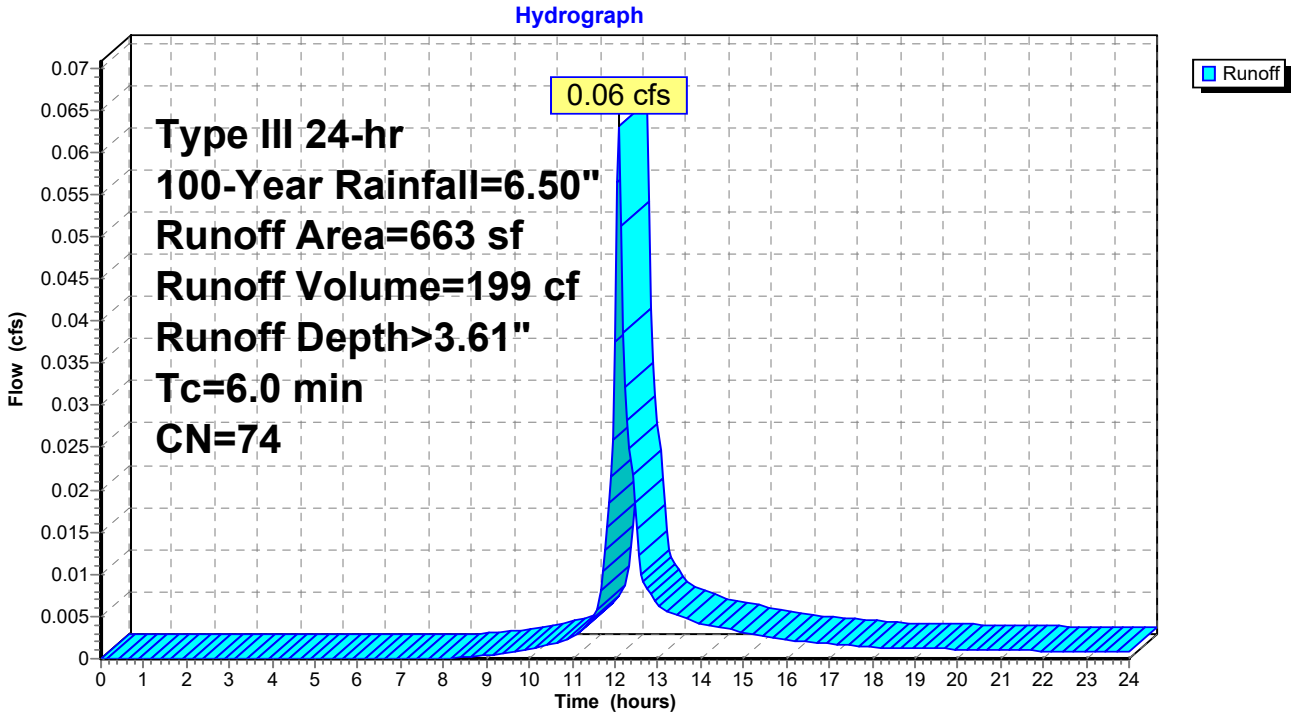
Runoff = 0.06 cfs @ 12.09 hrs, Volume= 199 cf, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
422	61	>75% Grass cover, Good, HSG B
241	98	Roofs, HSG B
663	74	Weighted Average
422		63.65% Pervious Area
241		36.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 2S: Exist to North



Summary for Subcatchment 3S: Exist to Northwest

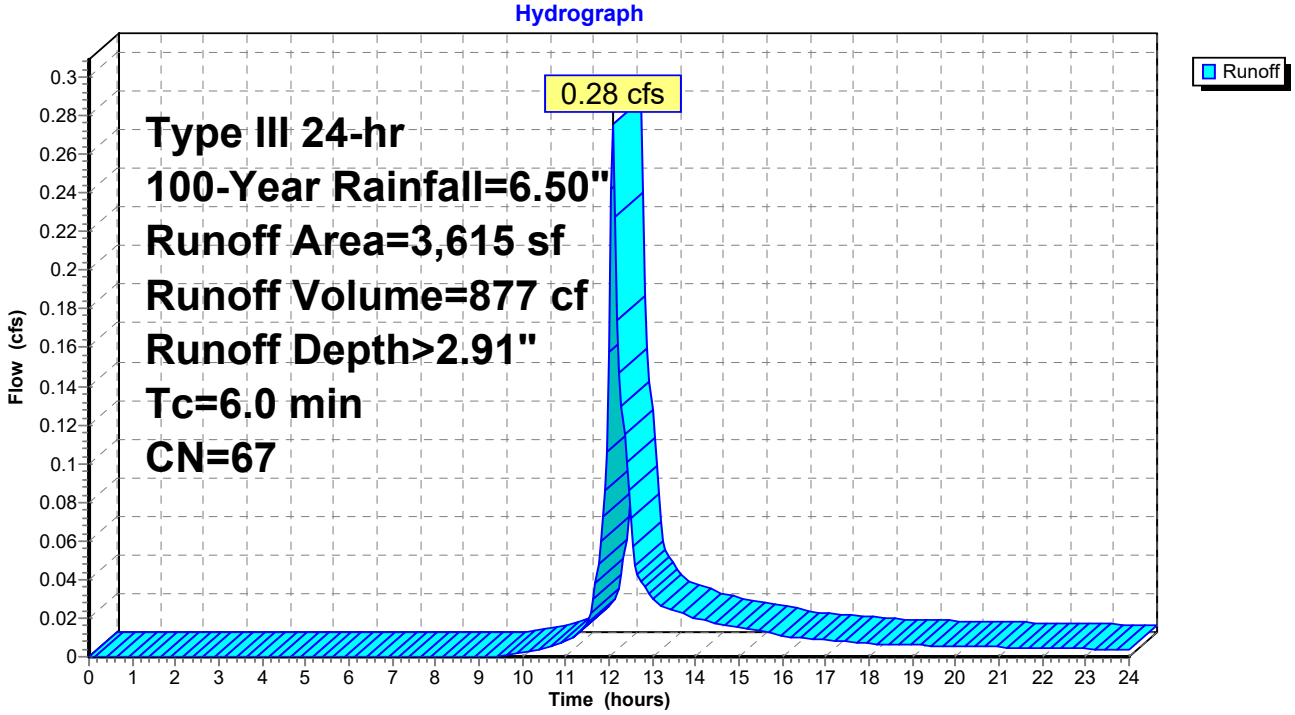
Runoff = 0.28 cfs @ 12.10 hrs, Volume= 877 cf, Depth> 2.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
2,987	61	>75% Grass cover, Good, HSG B
594	98	Roofs, HSG B
34	98	Unconnected pavement, HSG B
3,615	67	Weighted Average
2,987		82.63% Pervious Area
628		17.37% Impervious Area
34		5.41% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 3S: Exist to Northwest

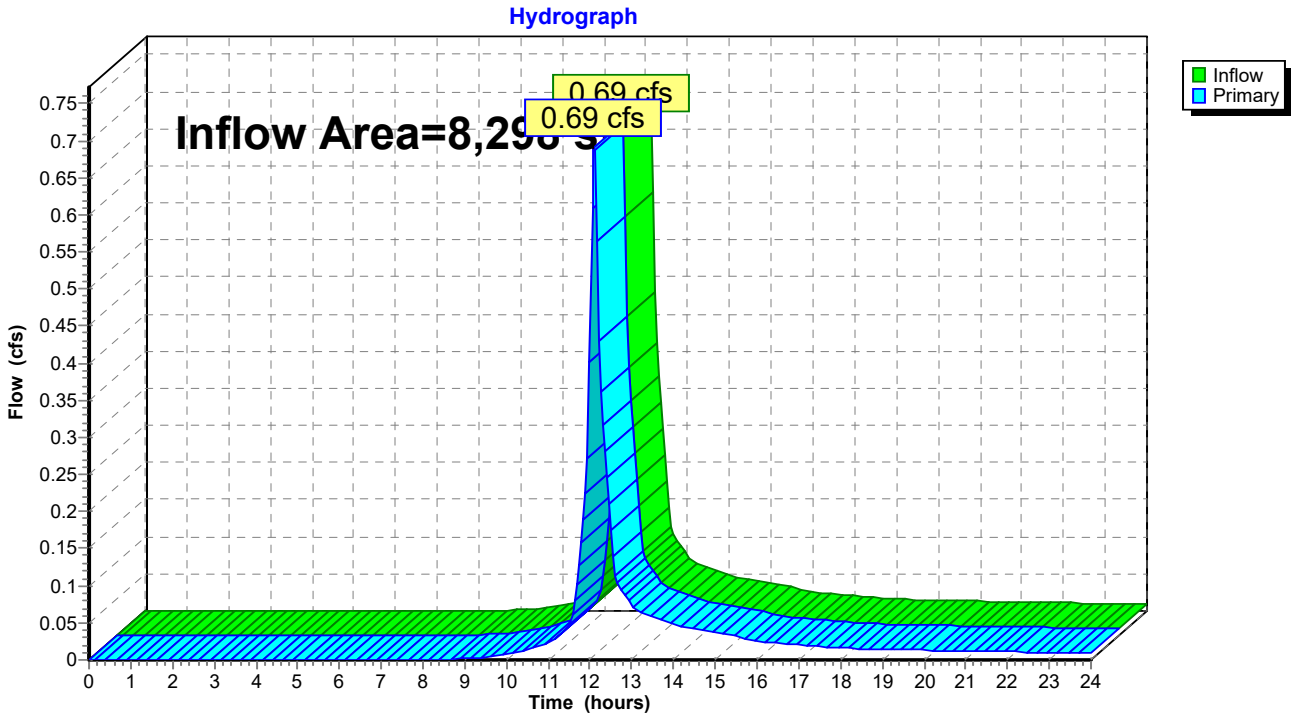


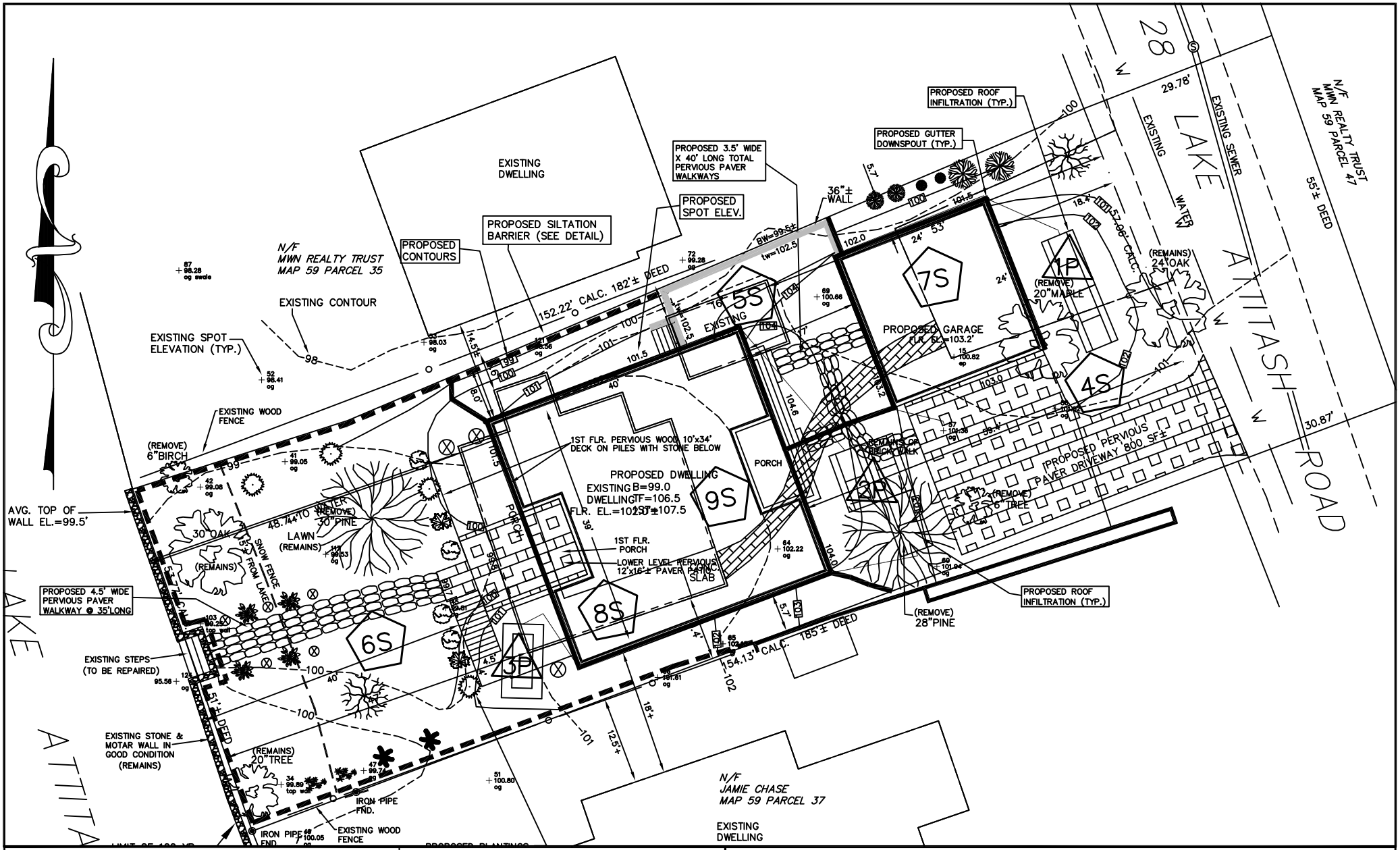
Summary for Link 1L: Total Site Exist

Inflow Area = 8,298 sf, 22.95% Impervious, Inflow Depth > 3.16" for 100-Year event
Inflow = 0.69 cfs @ 12.09 hrs, Volume= 2,183 cf
Primary = 0.69 cfs @ 12.09 hrs, Volume= 2,183 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Total Site Exist





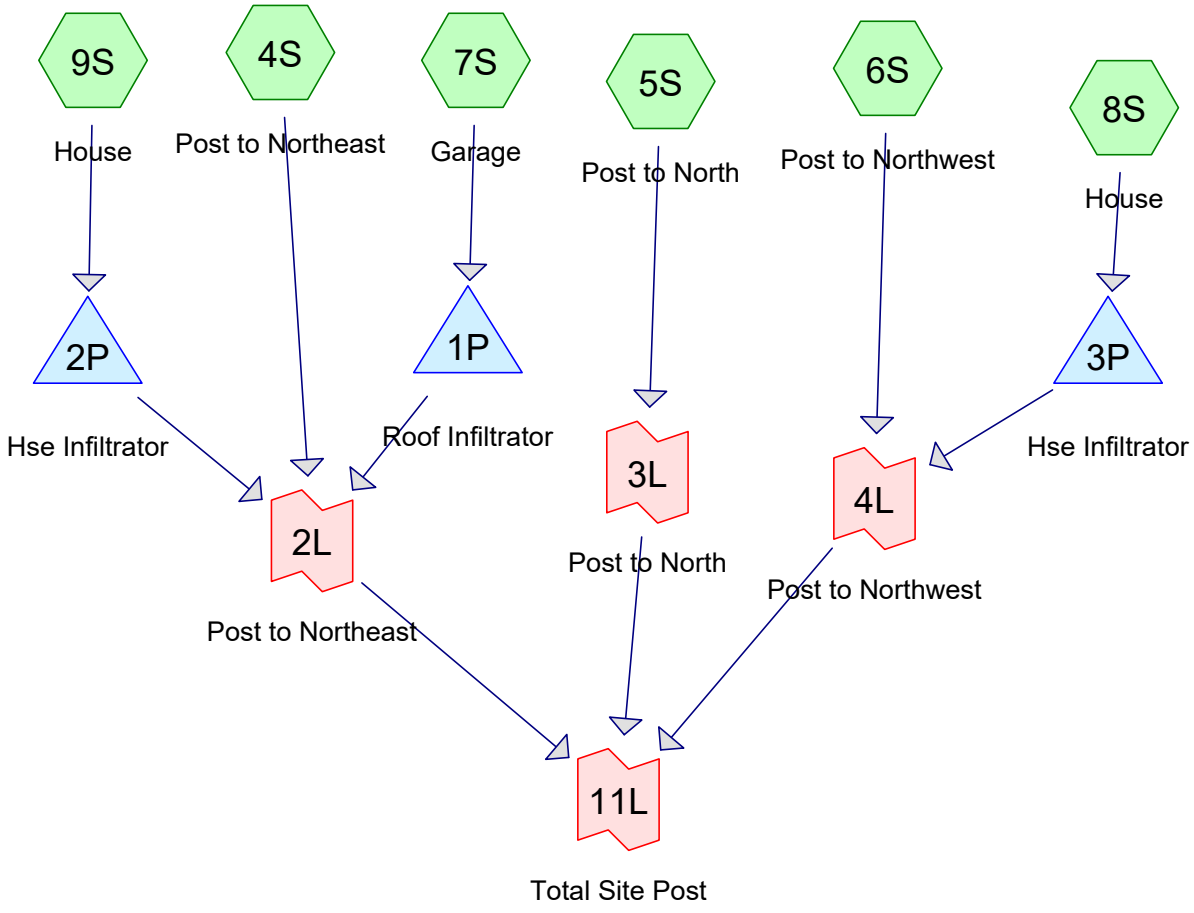
DATE: MAY 23, 2016

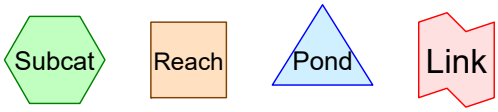
SCALE = NTS

POST–DEVELOPMENT WATERSHED PERMIT PLAN

28 LAKE ATTITASH ROAD
AMESBURY, MASSACHUSETTS

ATLANTIC ENGINEERING & SURVEY CONSULTANTS INC.
97 TENNEY STREET – – GEORGETOWN, MA 01833
PHONE: 978–352–7870 FAX: 978–352–9940





Routing Diagram for Attitash-Rev_052216
Prepared by George J. Zambouras, P.E.
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Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
4,913	61	>75% Grass cover, Good, HSG B (4S, 5S, 6S)
2,136	98	Roofs, HSG B (7S, 8S, 9S)
1,204	80	Unconnected pavement, HSG B (4S, 5S, 6S)
45	98	Unconnected pavement, HSG B (5S)
8,298	**73**	**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 4S: Post to Northeast Runoff Area=2,224 sf 0.00% Impervious Runoff Depth>0.68"
Tc=6.0 min CN=68 Runoff=0.03 cfs 126 cf

Subcatchment 5S: Post to North Runoff Area=892 sf 5.04% Impervious Runoff Depth>0.51"
Tc=6.0 min UI Adjusted CN=64 Runoff=0.01 cfs 38 cf

Subcatchment 6S: Post to Northwest Runoff Area=3,046 sf 0.00% Impervious Runoff Depth>0.47"
Tc=6.0 min CN=63 Runoff=0.03 cfs 120 cf

Subcatchment 7S: Garage Runoff Area=576 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.04 cfs 138 cf

Subcatchment 8S: House Runoff Area=390 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.03 cfs 93 cf

Subcatchment 9S: House Runoff Area=1,170 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.08 cfs 279 cf

Pond 1P: Roof Infiltrator Peak Elev=99.62' Storage=48 cf Inflow=0.04 cfs 138 cf
Discarded=0.00 cfs 137 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 137 cf

Pond 2P: Hse Infiltrator Peak Elev=100.71' Storage=111 cf Inflow=0.08 cfs 279 cf
Discarded=0.01 cfs 279 cf Primary=0.00 cfs 0 cf Outflow=0.01 cfs 279 cf

Pond 3P: Hse Infiltrator Peak Elev=99.71' Storage=37 cf Inflow=0.03 cfs 93 cf
Discarded=0.00 cfs 93 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 93 cf

Link 2L: Post to Northeast Inflow=0.03 cfs 126 cf
Primary=0.03 cfs 126 cf

Link 3L: Post to North Inflow=0.01 cfs 38 cf
Primary=0.01 cfs 38 cf

Link 4L: Post to Northwest Inflow=0.03 cfs 120 cf
Primary=0.03 cfs 120 cf

Link 11L: Total Site Post Inflow=0.07 cfs 284 cf
Primary=0.07 cfs 284 cf

Total Runoff Area = 8,298 sf Runoff Volume = 794 cf Average Runoff Depth = 1.15"
73.72% Pervious = 6,117 sf 26.28% Impervious = 2,181 sf

Summary for Subcatchment 4S: Post to Northeast

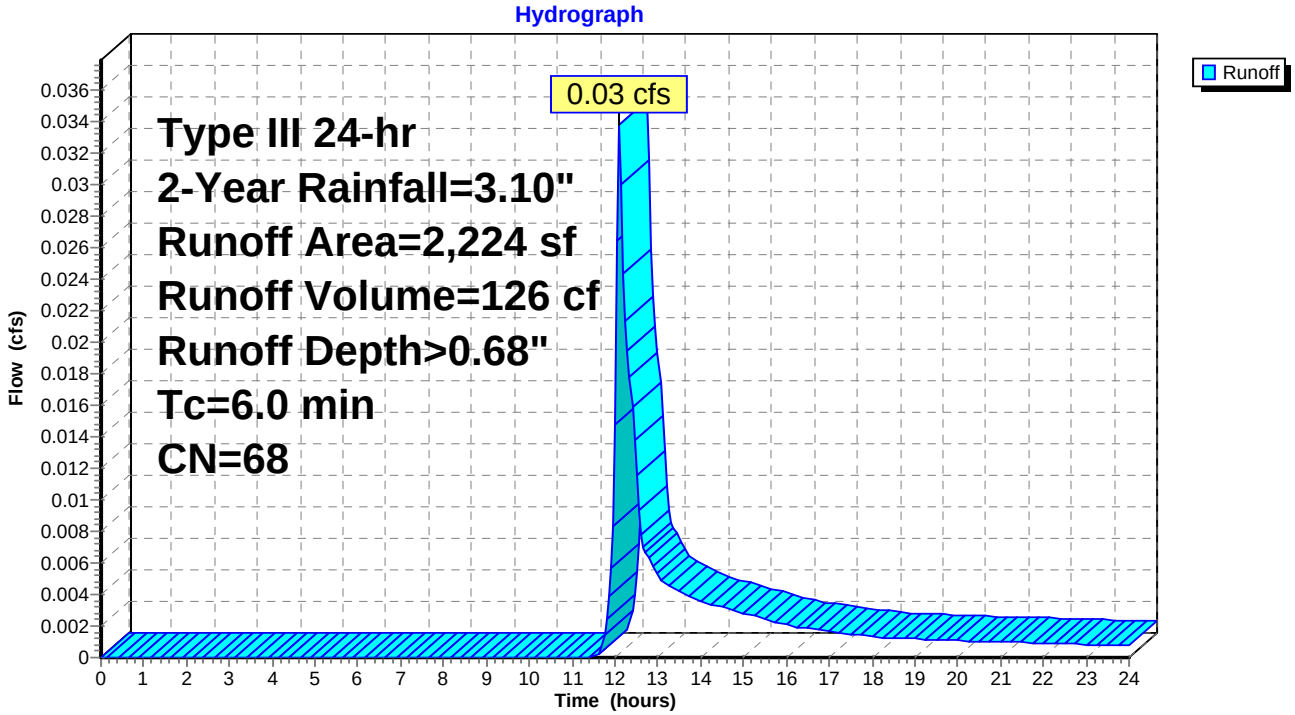
Runoff = 0.03 cfs @ 12.11 hrs, Volume= 126 cf, Depth> 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
	1,410	61	>75% Grass cover, Good, HSG B
*	814	80	Unconnected pavement, HSG B
	2,224	68	Weighted Average
	2,224		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 4S: Post to Northeast



Summary for Subcatchment 5S: Post to North

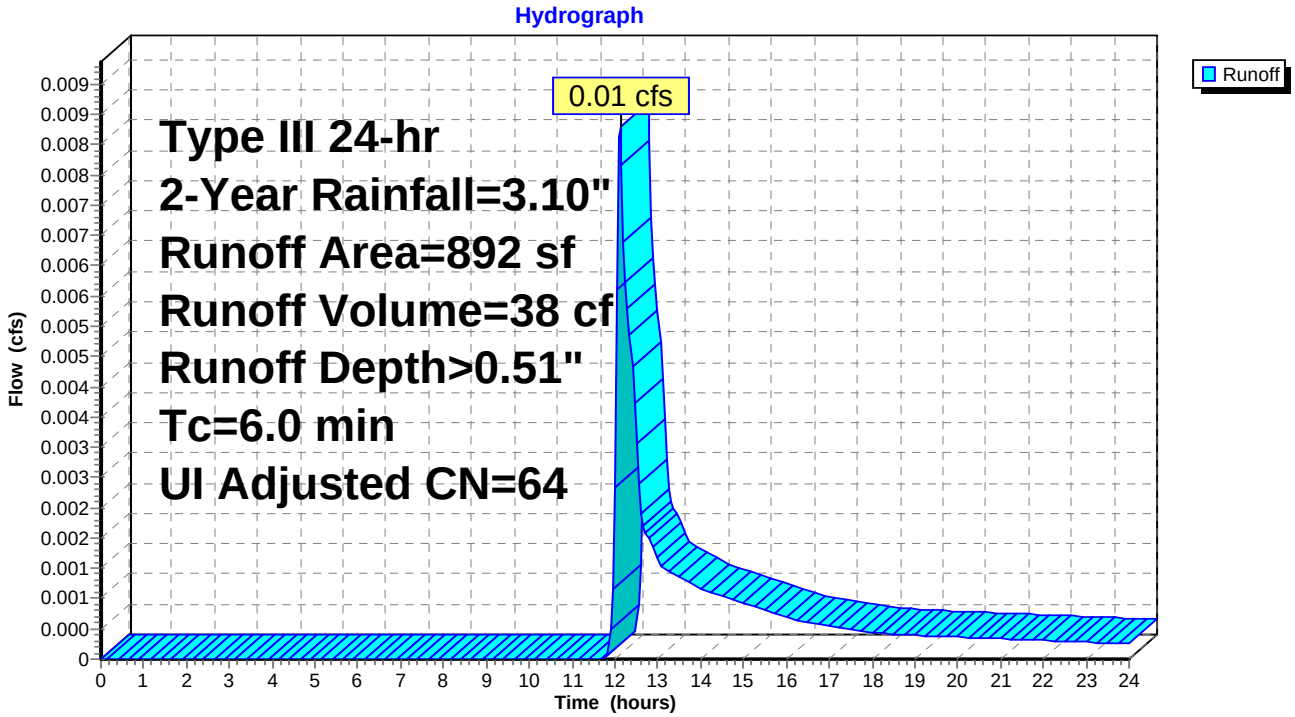
Runoff = 0.01 cfs @ 12.12 hrs, Volume= 38 cf, Depth> 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Adj	Description
	756	61		>75% Grass cover, Good, HSG B
*	91	80		Unconnected pavement, HSG B
	45	98		Unconnected pavement, HSG B
	892	65	64	Weighted Average, UI Adjusted
	847			94.96% Pervious Area
	45			5.04% Impervious Area
	45			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 5S: Post to North



Summary for Subcatchment 6S: Post to Northwest

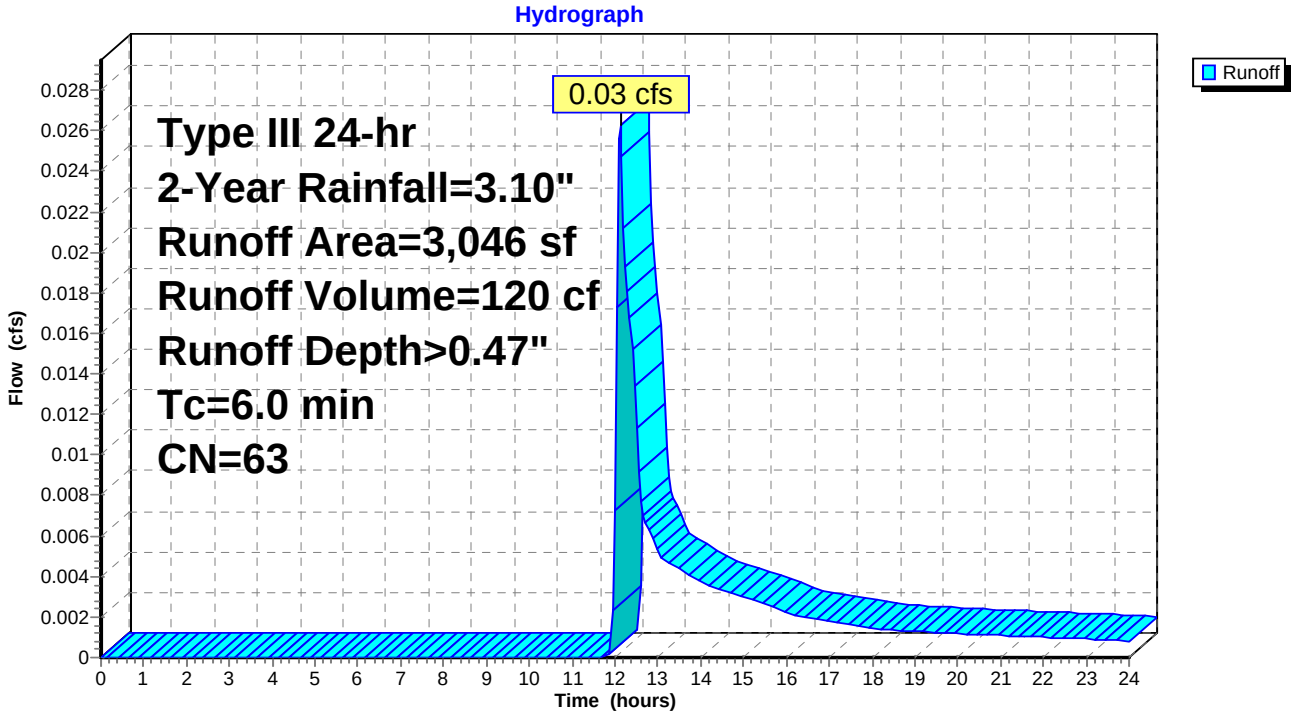
Runoff = 0.03 cfs @ 12.12 hrs, Volume= 120 cf, Depth> 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
	2,747	61	>75% Grass cover, Good, HSG B
*	299	80	Unconnected pavement, HSG B
	3,046	63	Weighted Average
	3,046		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 6S: Post to Northwest



Summary for Subcatchment 7S: Garage

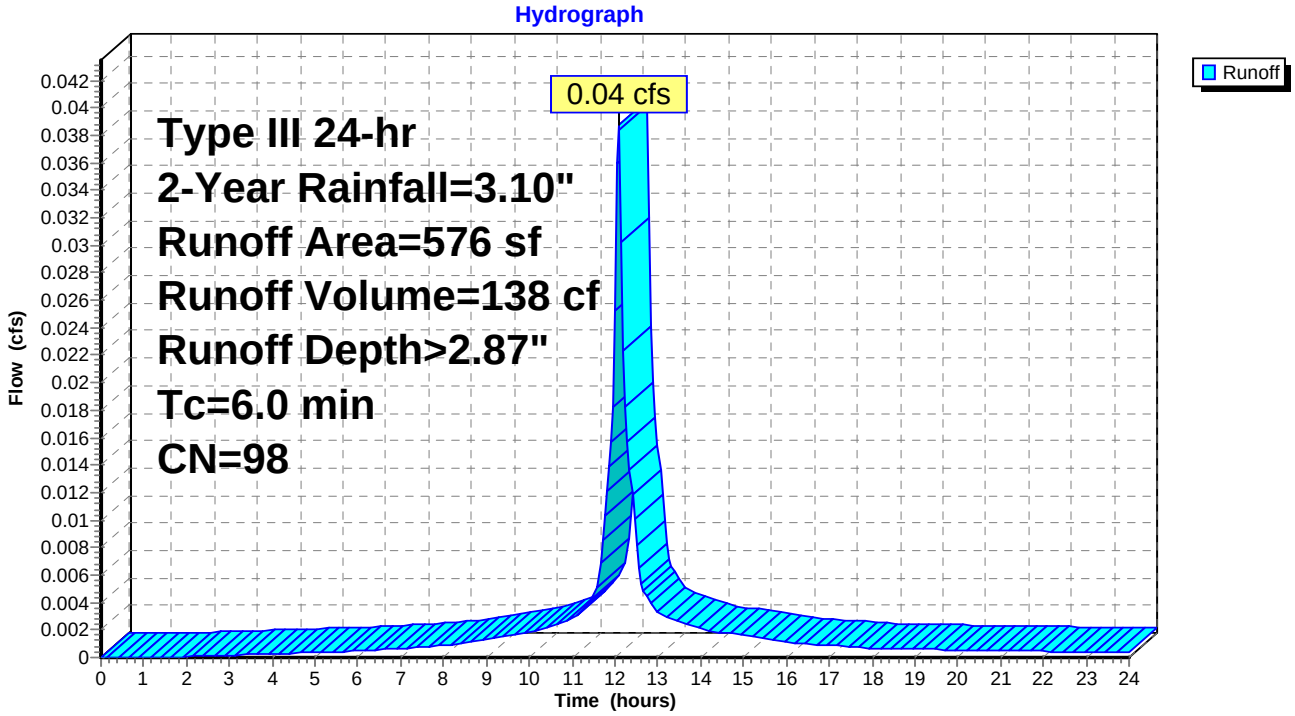
Runoff = 0.04 cfs @ 12.09 hrs, Volume= 138 cf, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
576	98	Roofs, HSG B
576		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 7S: Garage



Summary for Subcatchment 8S: House

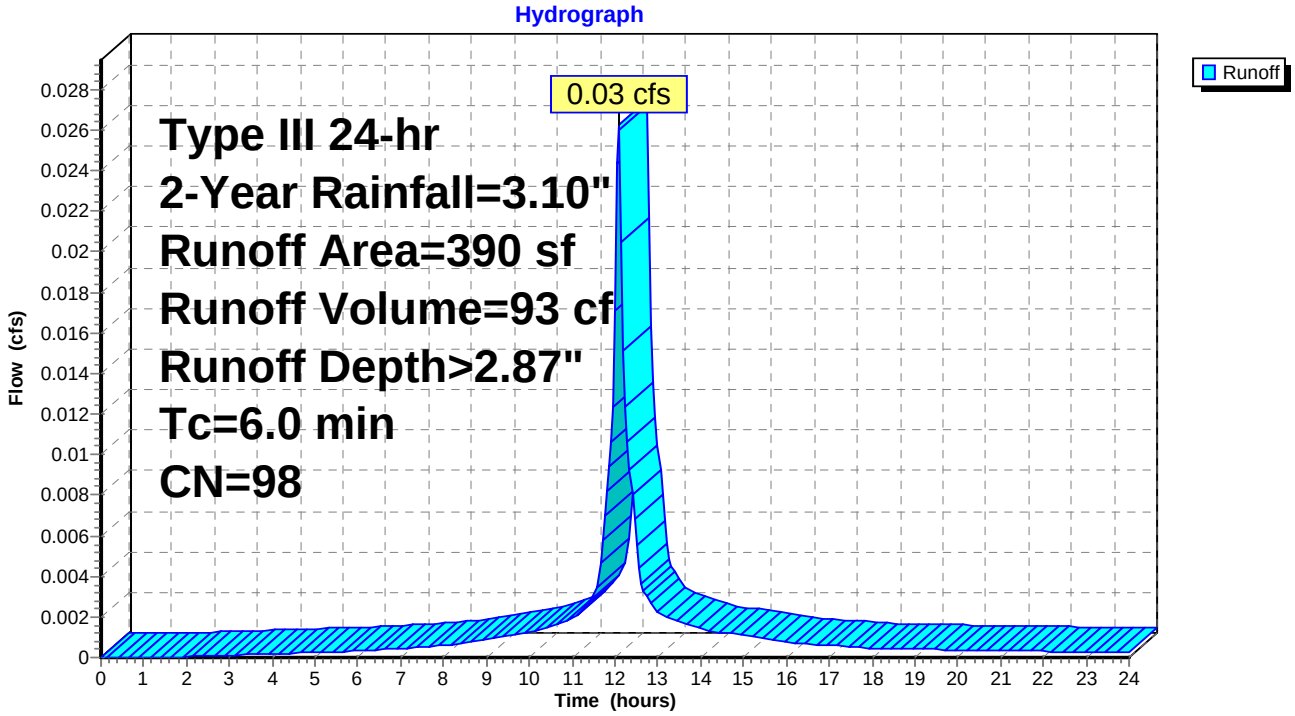
Runoff = 0.03 cfs @ 12.09 hrs, Volume= 93 cf, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
390	98	Roofs, HSG B
390		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 8S: House



Summary for Subcatchment 9S: House

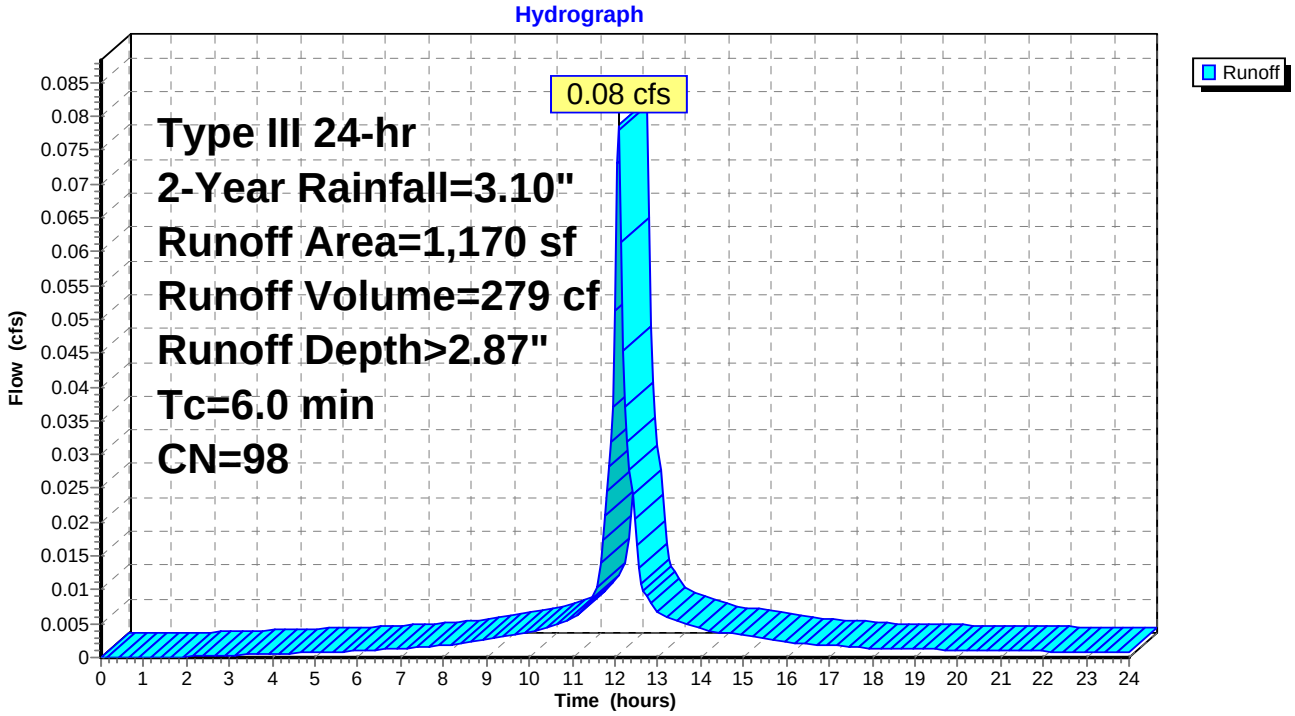
Runoff = 0.08 cfs @ 12.09 hrs, Volume= 279 cf, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
1,170	98	Roofs, HSG B
1,170		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 9S: House



Summary for Pond 1P: Roof Infiltrator

Inflow Area = 576 sf,100.00% Impervious, Inflow Depth > 2.87" for 2-Year event
Inflow = 0.04 cfs @ 12.09 hrs, Volume= 138 cf
Outflow = 0.00 cfs @ 11.40 hrs, Volume= 137 cf, Atten= 91%, Lag= 0.0 min
Discarded = 0.00 cfs @ 11.40 hrs, Volume= 137 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 99.62' @ 12.92 hrs Surf.Area= 132 sf Storage= 48 cf

Plug-Flow detention time= 93.0 min calculated for 137 cf (100% of inflow)
Center-of-Mass det. time= 92.3 min (848.9 - 756.6)

Volume	Invert	Avail.Storage	Storage Description
#1	98.80'	96 cf	**Stone Area (Prismatic)**Listed below x 2 264 cf Overall - 24 cf Embedded = 240 cf x 40.0% Voids
#2	99.30'	24 cf	**Infiltrator Quick 4 - 4 units**Listed below x 2 Inside #1
		120 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.80	66	0	0
100.80	66	132	132

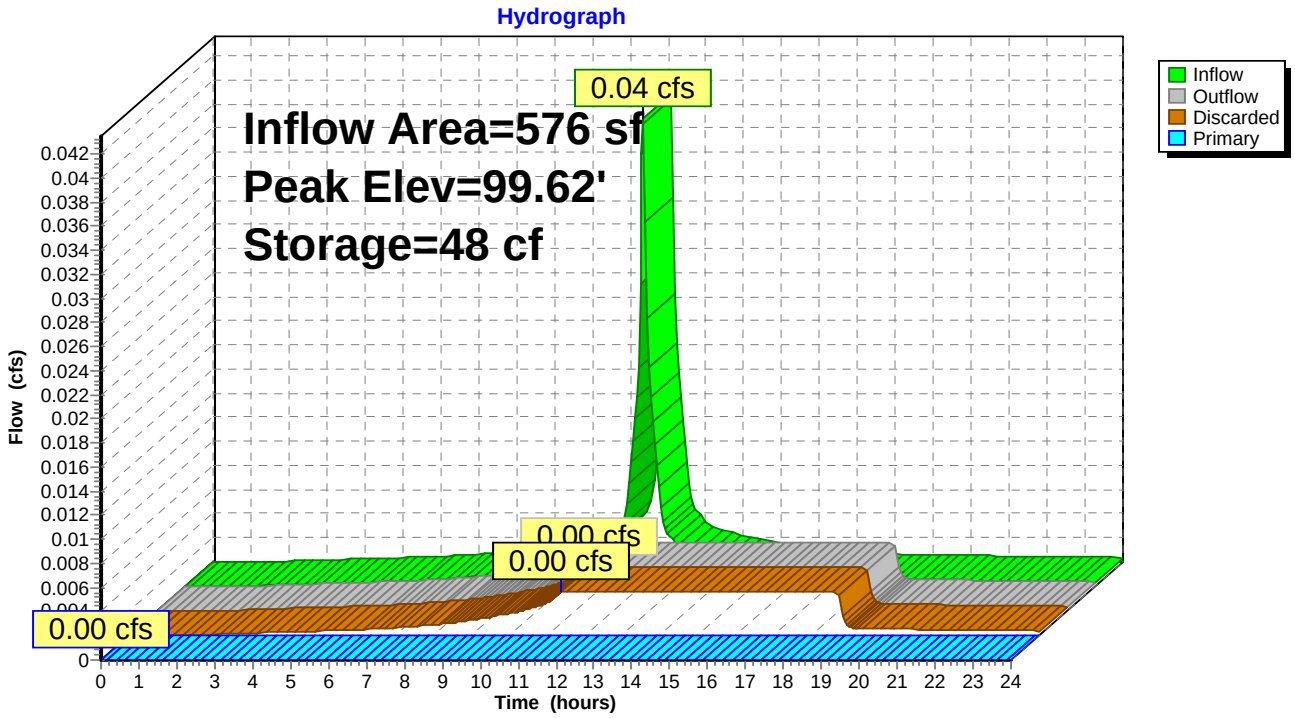
Elevation (feet)	Cum.Store (cubic-feet)
99.30	0
99.47	2
99.63	4
99.80	6
99.97	8
100.13	10
100.30	12

Device	Routing	Invert	Outlet Devices
#1	Primary	100.60'	**4.0" Vert. Downspout Overflow** C= 0.600
#2	Discarded	98.80'	**1.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 11.40 hrs HW=98.82' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=98.80' (Free Discharge)
└─**1=Downspout Overflow** (Controls 0.00 cfs)

Pond 1P: Roof Infiltrator



Summary for Pond 2P: Hse Infiltrator

Inflow Area =	1,170 sf,100.00% Impervious,	Inflow Depth >	2.87"	for 2-Year event	
Inflow =	0.08 cfs @	12.09 hrs,	Volume=	279 cf	
Outflow =	0.01 cfs @	11.05 hrs,	Volume=	279 cf,	Atten= 93%, Lag= 0.0 min
Discarded =	0.01 cfs @	11.05 hrs,	Volume=	279 cf	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 100.71' @ 13.39 hrs Surf.Area= 198 sf Storage= 111 cf

Plug-Flow detention time= 155.7 min calculated for 279 cf (100% of inflow)
Center-of-Mass det. time= 154.9 min (911.6 - 756.6)

Volume	Invert	Avail.Storage	Storage Description
#1	99.50'	144 cf	**Stone Area (Prismatic)**Listed below x 3 396 cf Overall - 36 cf Embedded = 360 cf x 40.0% Voids
#2	100.00'	36 cf	**Infiltrator Quick 4 - 6 units**Listed below x 3 Inside #1
		180 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.50	66	0	0
101.50	66	132	132

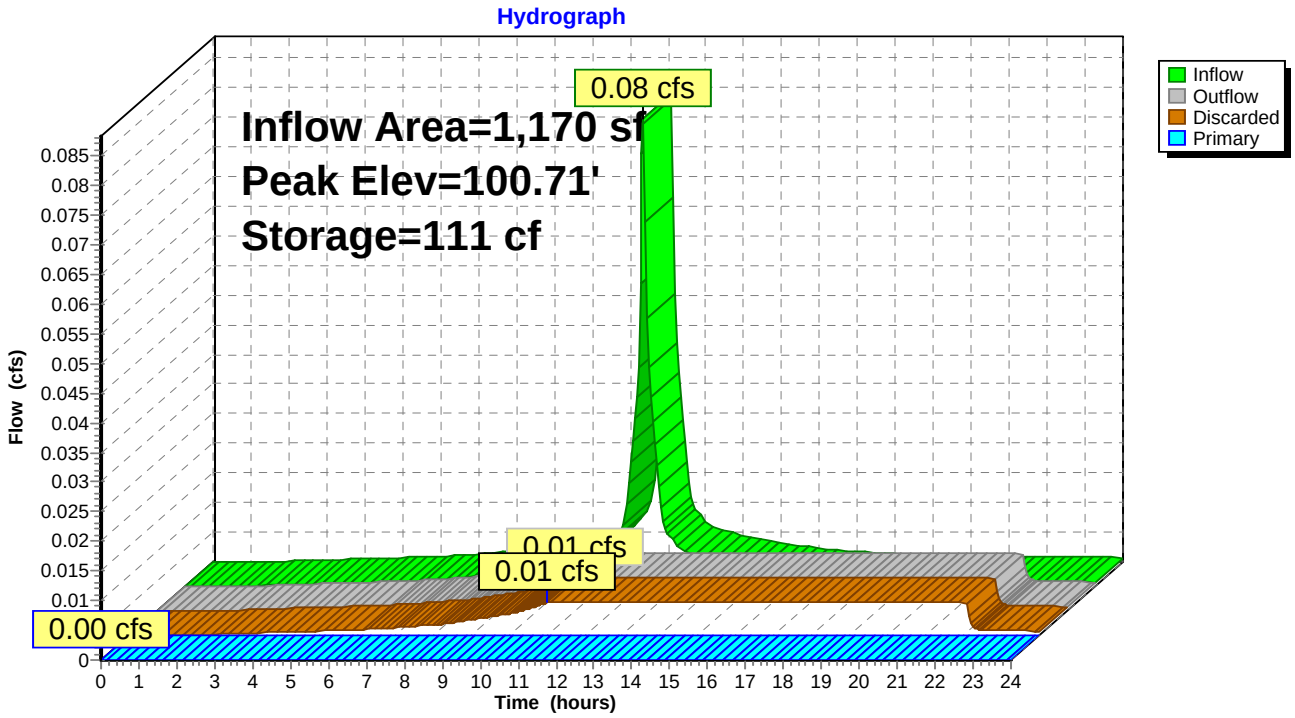
Elevation (feet)	Cum.Store (cubic-feet)
100.00	0
100.17	2
100.33	4
100.50	6
100.67	8
100.83	10
101.00	12

Device	Routing	Invert	Outlet Devices
#1	Primary	101.23'	**3.0" Vert. Downspout Overflow X 2.00** C= 0.600
#2	Discarded	99.50'	**1.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 11.05 hrs HW=99.52' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=99.50' (Free Discharge)
└─**1=Downspout Overflow** (Controls 0.00 cfs)

Pond 2P: Hse Infiltrator



Summary for Pond 3P: Hse Infiltrator

Inflow Area =	390 sf,100.00% Impervious,	Inflow Depth >	2.87"	for 2-Year event	
Inflow =	0.03 cfs @	12.09 hrs,	Volume=	93 cf	
Outflow =	0.00 cfs @	11.05 hrs,	Volume=	93 cf,	Atten= 93%, Lag= 0.0 min
Discarded =	0.00 cfs @	11.05 hrs,	Volume=	93 cf	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 99.71' @ 13.39 hrs Surf.Area= 66 sf Storage= 37 cf

Plug-Flow detention time= 155.7 min calculated for 93 cf (100% of inflow)
Center-of-Mass det. time= 154.9 min (911.6 - 756.6)

Volume	Invert	Avail.Storage	Storage Description
#1	98.50'	48 cf	**Stone Area (Prismatic)**Listed below 132 cf Overall - 12 cf Embedded = 120 cf x 40.0% Voids
#2	99.00'	12 cf	**Infiltrator Quick 4 - 2 units**Listed below Inside #1
		60 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.50	66	0	0
100.50	66	132	132

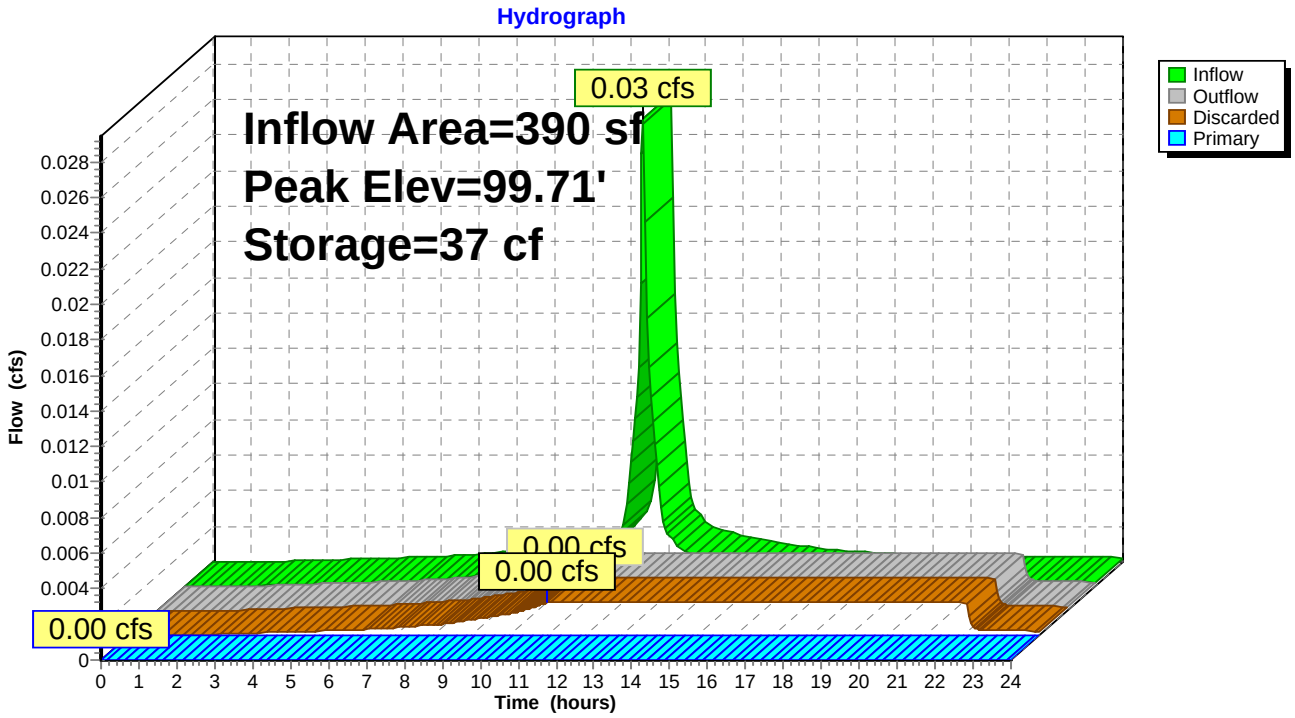
Elevation (feet)	Cum.Store (cubic-feet)
99.00	0
99.17	2
99.33	4
99.50	6
99.67	8
99.83	10
100.00	12

Device	Routing	Invert	Outlet Devices
#1	Primary	100.23'	**3.0" Vert. Downspout Overflow X 2.00** C= 0.600
#2	Discarded	98.50'	**1.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 11.05 hrs HW=98.52' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=98.50' (Free Discharge)
└─**1=Downspout Overflow** (Controls 0.00 cfs)

Pond 3P: Hse Infiltrator

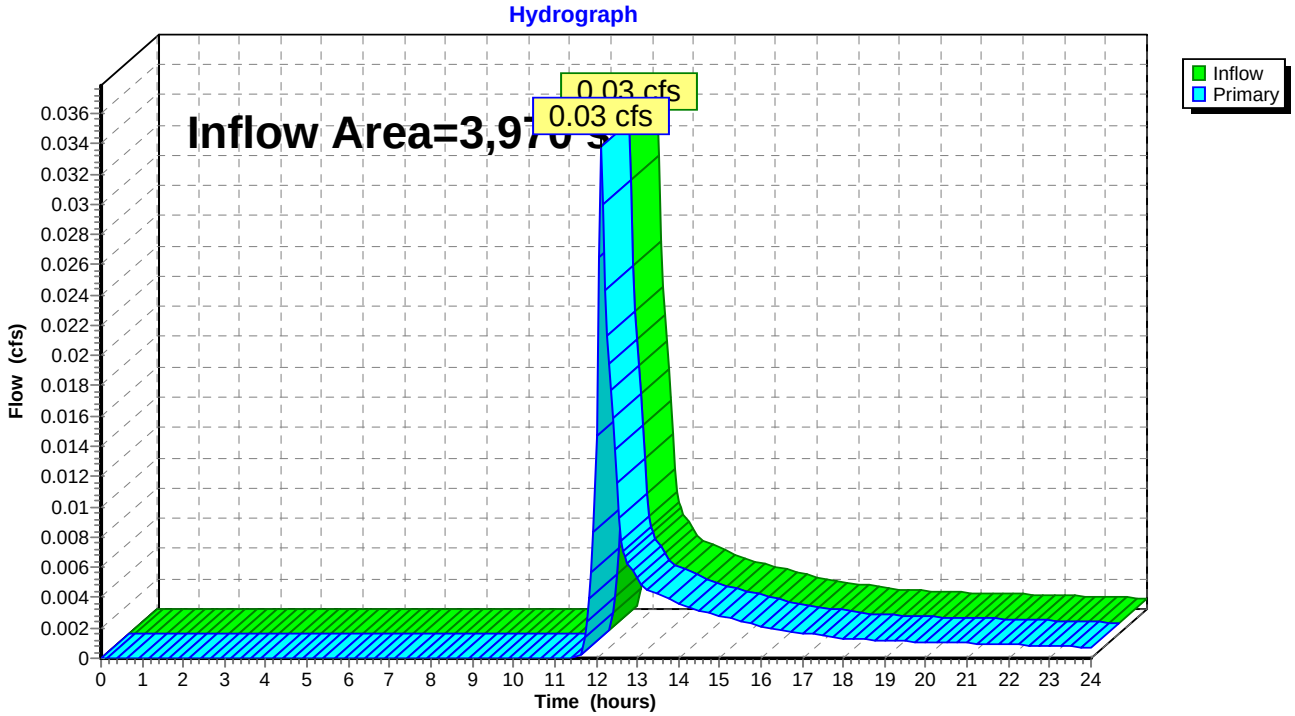


Summary for Link 2L: Post to Northeast

Inflow Area = 3,970 sf, 43.98% Impervious, Inflow Depth > 0.38" for 2-Year event
Inflow = 0.03 cfs @ 12.11 hrs, Volume= 126 cf
Primary = 0.03 cfs @ 12.11 hrs, Volume= 126 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: Post to Northeast

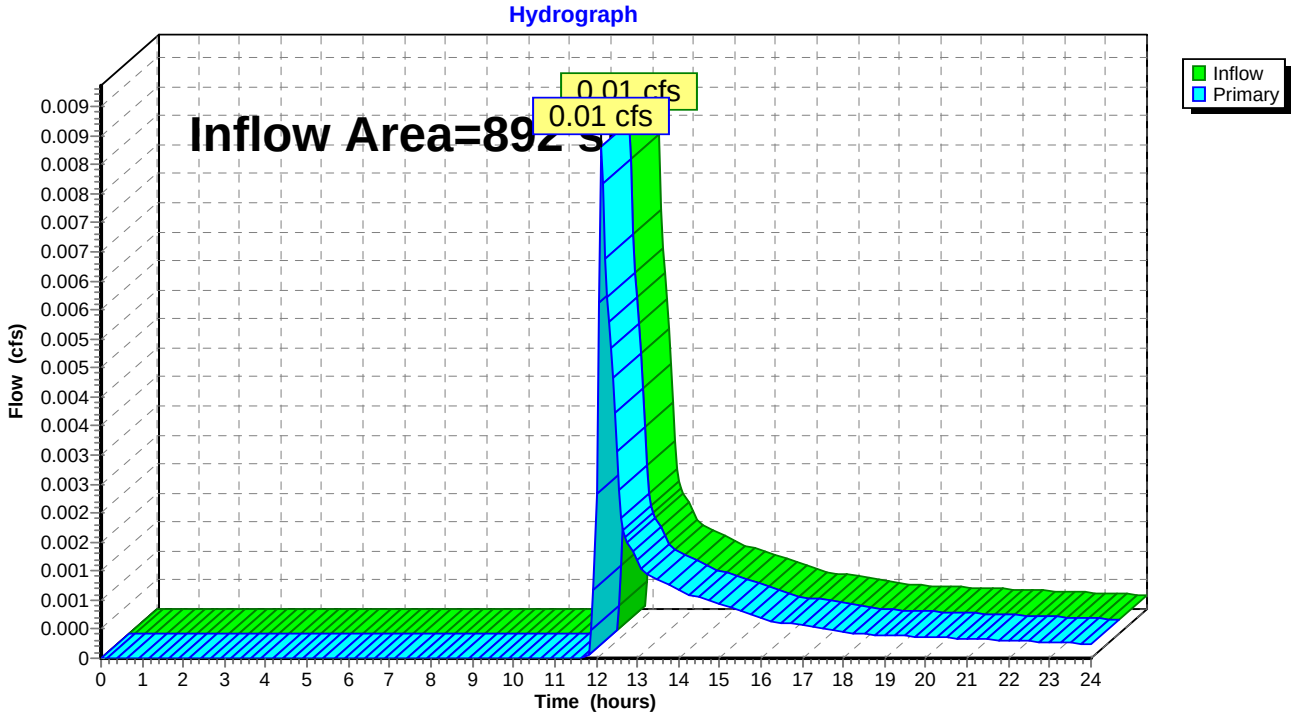


Summary for Link 3L: Post to North

Inflow Area = 892 sf, 5.04% Impervious, Inflow Depth > 0.51" for 2-Year event
Inflow = 0.01 cfs @ 12.12 hrs, Volume= 38 cf
Primary = 0.01 cfs @ 12.12 hrs, Volume= 38 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 3L: Post to North

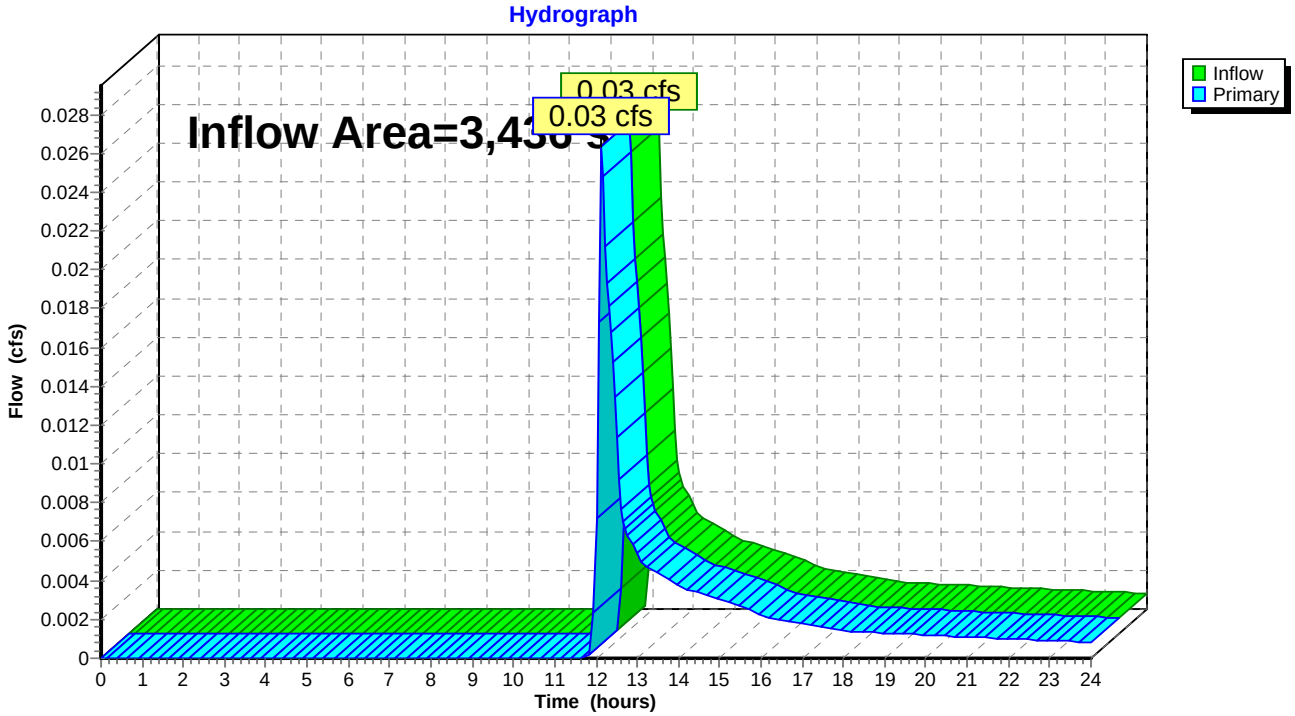


Summary for Link 4L: Post to Northwest

Inflow Area = 3,436 sf, 11.35% Impervious, Inflow Depth > 0.42" for 2-Year event
Inflow = 0.03 cfs @ 12.12 hrs, Volume= 120 cf
Primary = 0.03 cfs @ 12.12 hrs, Volume= 120 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: Post to Northwest

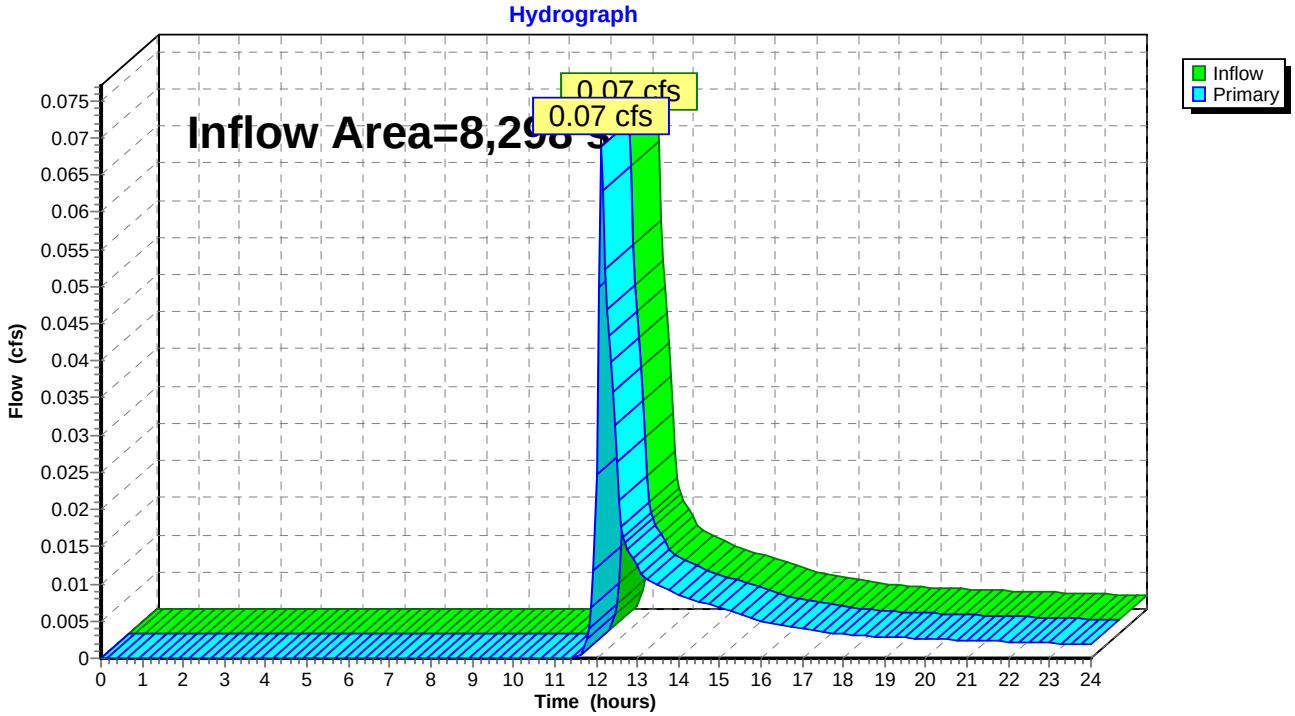


Summary for Link 11L: Total Site Post

Inflow Area = 8,298 sf, 26.28% Impervious, Inflow Depth > 0.41" for 2-Year event
Inflow = 0.07 cfs @ 12.11 hrs, Volume= 284 cf
Primary = 0.07 cfs @ 12.11 hrs, Volume= 284 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 11L: Total Site Post



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 4S: Post to Northeast Runoff Area=2,224 sf 0.00% Impervious Runoff Depth>1.53"
Tc=6.0 min CN=68 Runoff=0.09 cfs 284 cf

Subcatchment 5S: Post to North Runoff Area=892 sf 5.04% Impervious Runoff Depth>1.26"
Tc=6.0 min UI Adjusted CN=64 Runoff=0.03 cfs 94 cf

Subcatchment 6S: Post to Northwest Runoff Area=3,046 sf 0.00% Impervious Runoff Depth>1.20"
Tc=6.0 min CN=63 Runoff=0.09 cfs 305 cf

Subcatchment 7S: Garage Runoff Area=576 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=0.06 cfs 205 cf

Subcatchment 8S: House Runoff Area=390 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=0.04 cfs 138 cf

Subcatchment 9S: House Runoff Area=1,170 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=0.12 cfs 415 cf

Pond 1P: Roof Infiltrator Peak Elev=100.14' Storage=83 cf Inflow=0.06 cfs 205 cf
Discarded=0.00 cfs 204 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 204 cf

Pond 2P: Hse Infiltrator Peak Elev=101.30' Storage=164 cf Inflow=0.12 cfs 415 cf
Discarded=0.01 cfs 337 cf Primary=0.02 cfs 34 cf Outflow=0.03 cfs 371 cf

Pond 3P: Hse Infiltrator Peak Elev=100.28' Storage=54 cf Inflow=0.04 cfs 138 cf
Discarded=0.00 cfs 112 cf Primary=0.01 cfs 11 cf Outflow=0.01 cfs 124 cf

Link 2L: Post to Northeast Inflow=0.09 cfs 317 cf
Primary=0.09 cfs 317 cf

Link 3L: Post to North Inflow=0.03 cfs 94 cf
Primary=0.03 cfs 94 cf

Link 4L: Post to Northwest Inflow=0.09 cfs 316 cf
Primary=0.09 cfs 316 cf

Link 11L: Total Site Post Inflow=0.20 cfs 727 cf
Primary=0.20 cfs 727 cf

Total Runoff Area = 8,298 sf Runoff Volume = 1,441 cf Average Runoff Depth = 2.08"
73.72% Pervious = 6,117 sf 26.28% Impervious = 2,181 sf

Summary for Subcatchment 4S: Post to Northeast

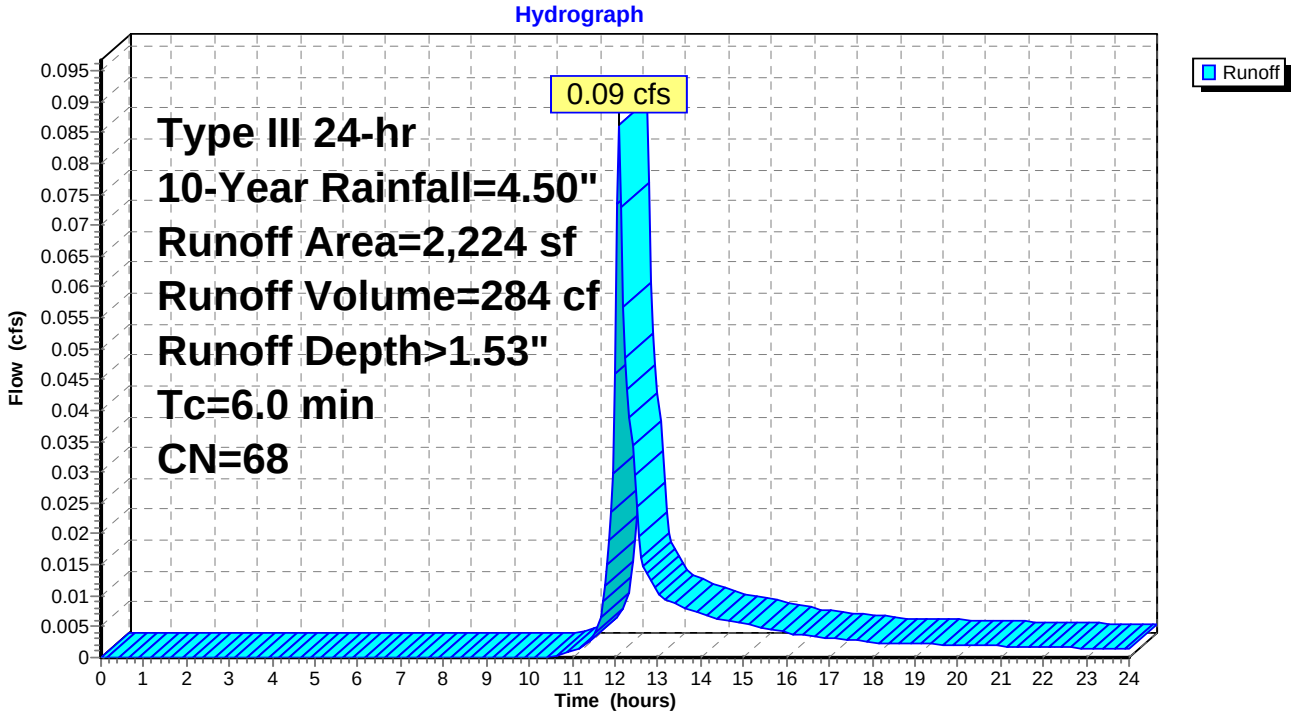
Runoff = 0.09 cfs @ 12.10 hrs, Volume= 284 cf, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

	Area (sf)	CN	Description
	1,410	61	>75% Grass cover, Good, HSG B
*	814	80	Unconnected pavement, HSG B
	2,224	68	Weighted Average
	2,224		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 4S: Post to Northeast



Summary for Subcatchment 5S: Post to North

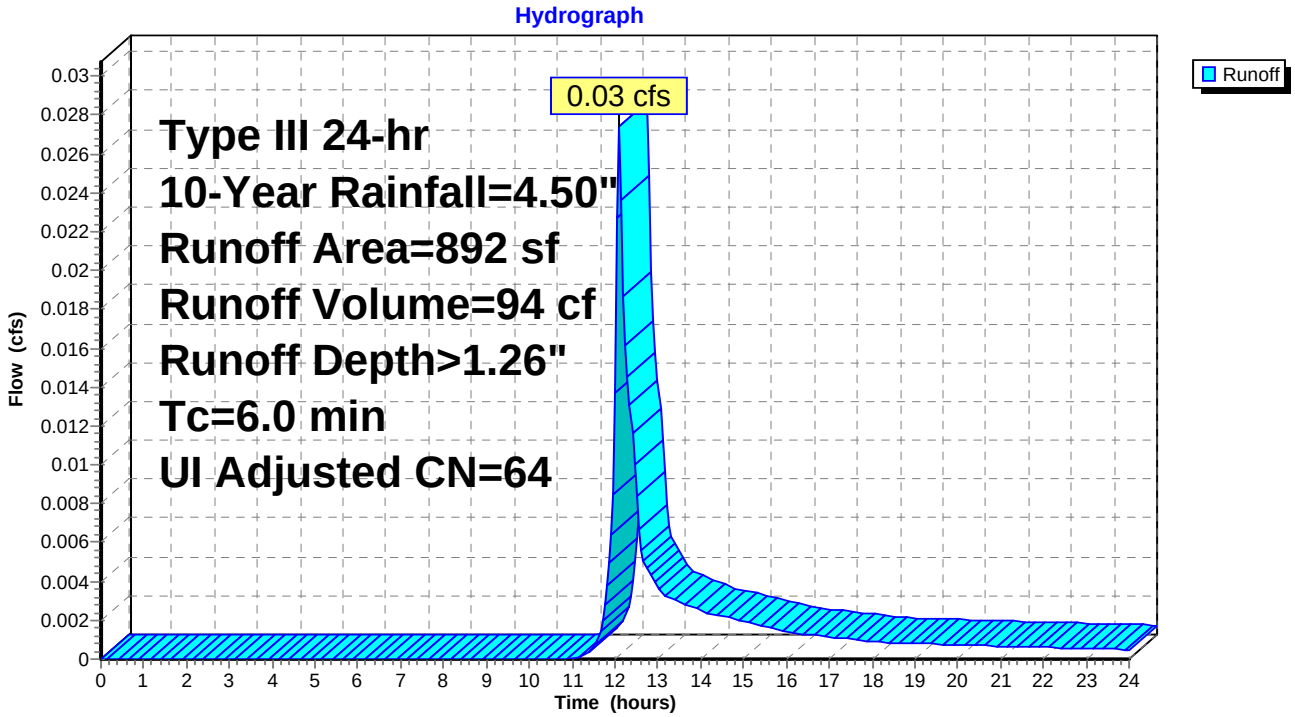
Runoff = 0.03 cfs @ 12.10 hrs, Volume= 94 cf, Depth> 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

	Area (sf)	CN	Adj	Description
	756	61		>75% Grass cover, Good, HSG B
*	91	80		Unconnected pavement, HSG B
	45	98		Unconnected pavement, HSG B
	892	65	64	Weighted Average, UI Adjusted
	847			94.96% Pervious Area
	45			5.04% Impervious Area
	45			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 5S: Post to North



Summary for Subcatchment 6S: Post to Northwest

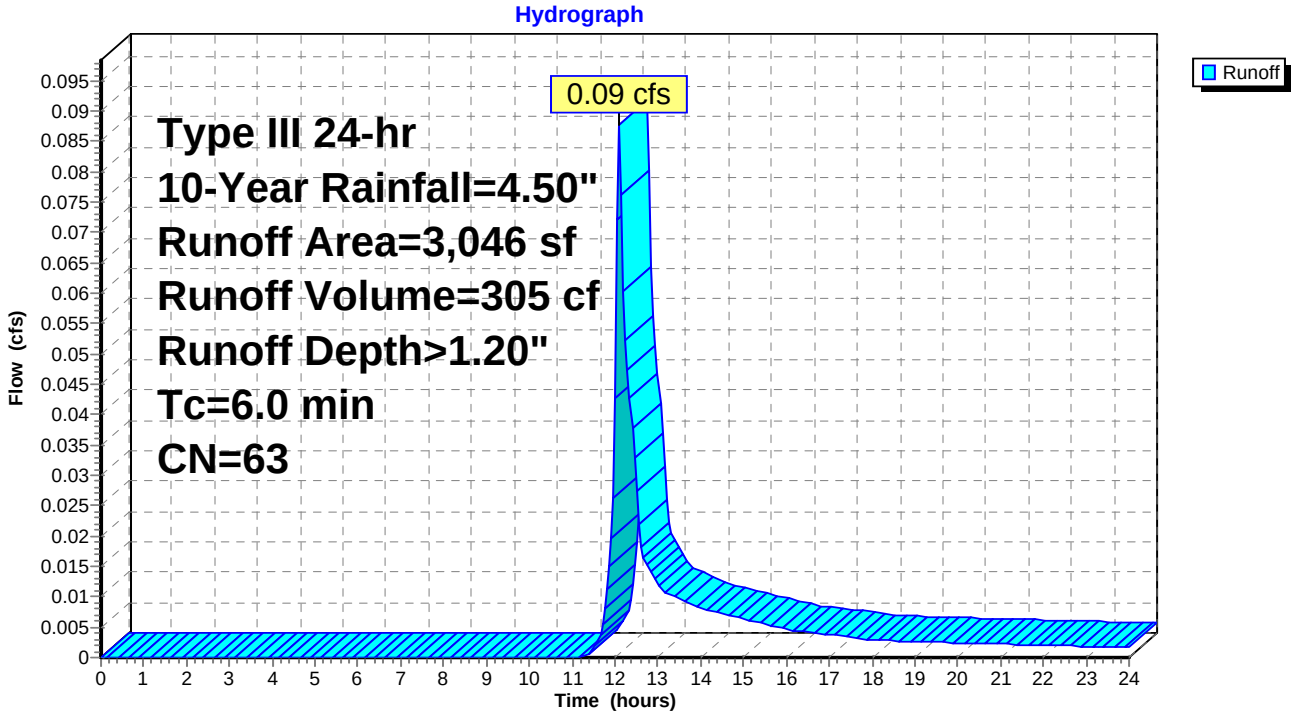
Runoff = 0.09 cfs @ 12.10 hrs, Volume= 305 cf, Depth> 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

	Area (sf)	CN	Description
	2,747	61	>75% Grass cover, Good, HSG B
*	299	80	Unconnected pavement, HSG B
	3,046	63	Weighted Average
	3,046		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 6S: Post to Northwest



Summary for Subcatchment 7S: Garage

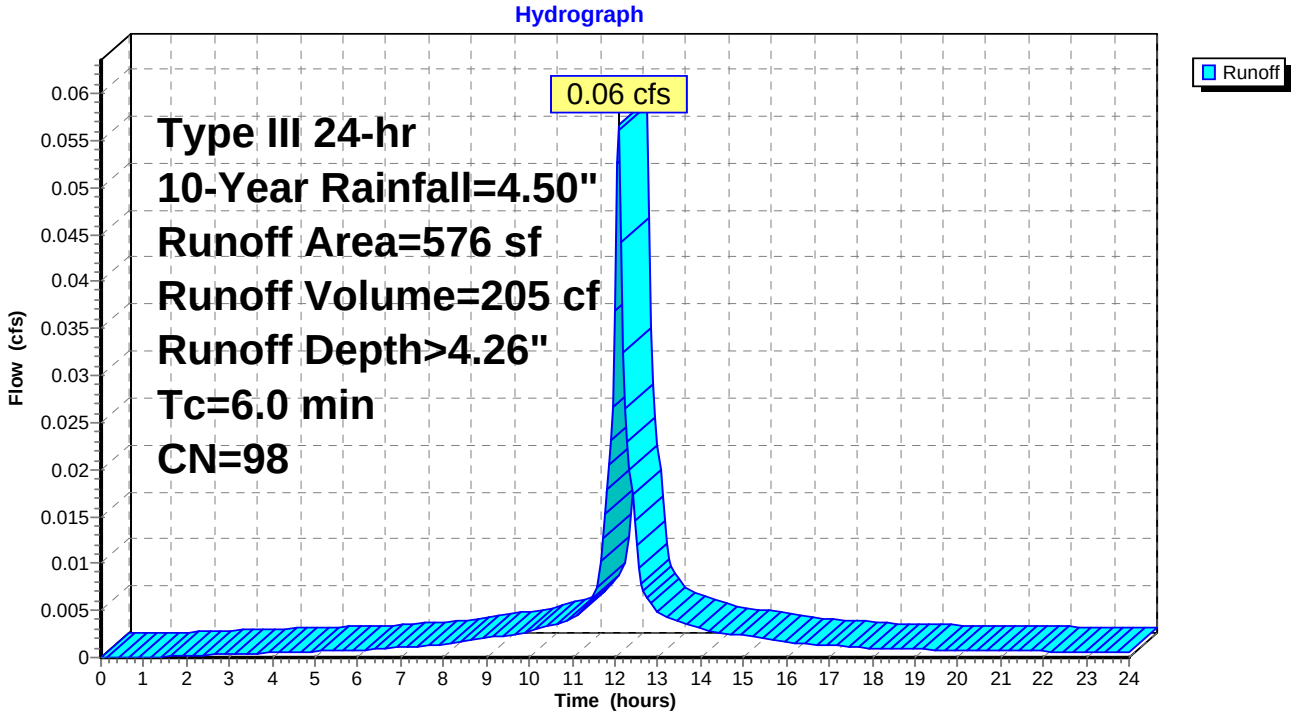
Runoff = 0.06 cfs @ 12.09 hrs, Volume= 205 cf, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
576	98	Roofs, HSG B
576		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 7S: Garage



Summary for Subcatchment 8S: House

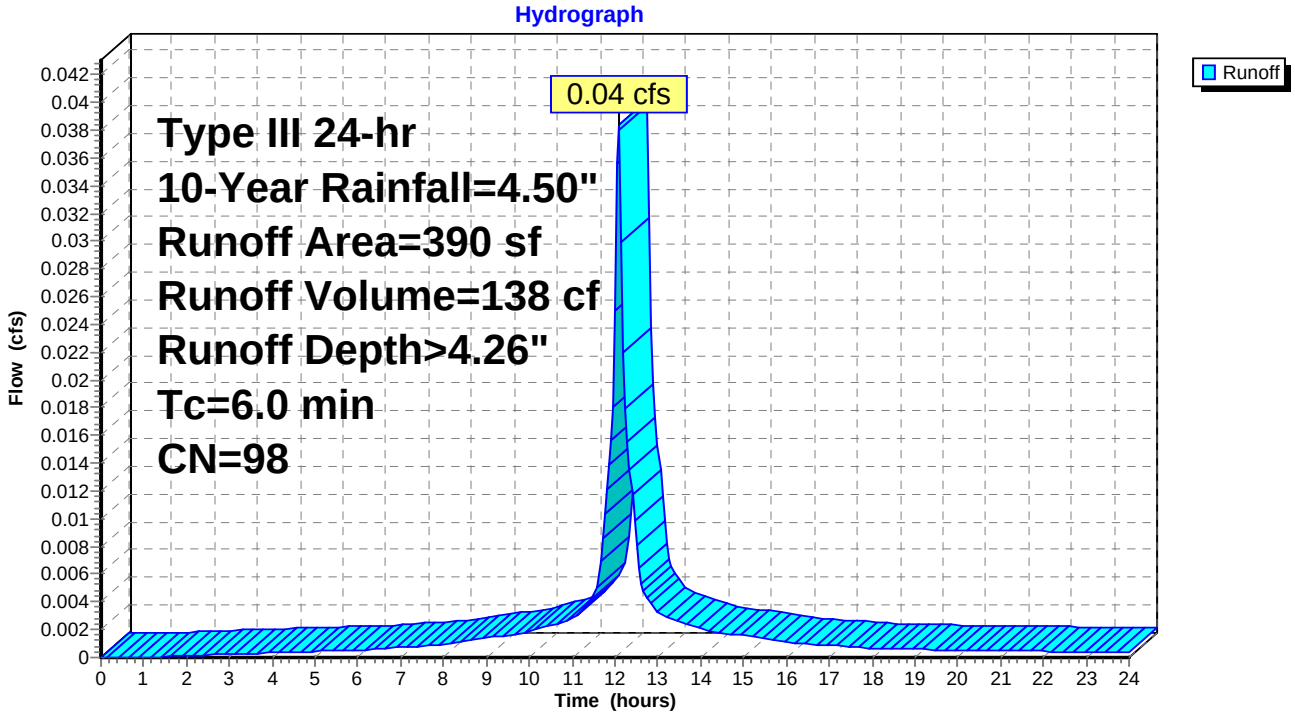
Runoff = 0.04 cfs @ 12.09 hrs, Volume= 138 cf, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
390	98	Roofs, HSG B
390		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 8S: House



Summary for Subcatchment 9S: House

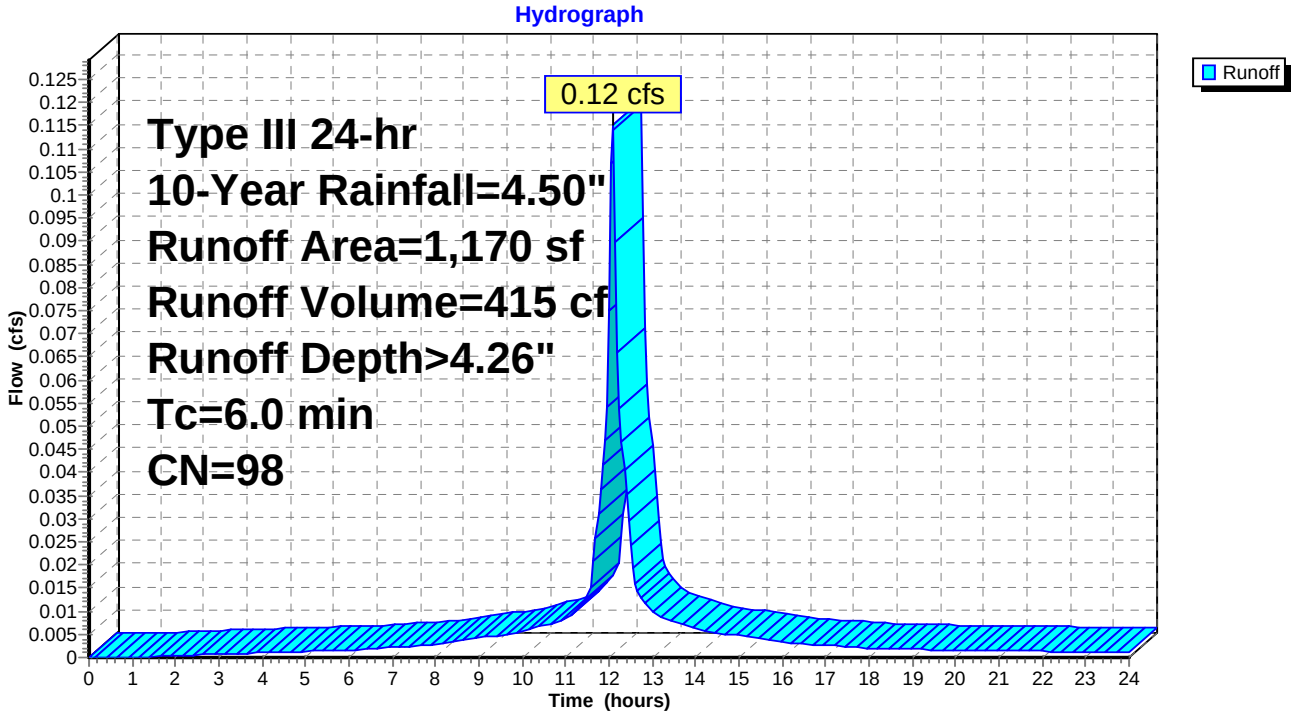
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 415 cf, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,170	98	Roofs, HSG B
1,170		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 9S: House



Summary for Pond 1P: Roof Infiltrator

Inflow Area = 576 sf,100.00% Impervious, Inflow Depth > 4.26" for 10-Year event
Inflow = 0.06 cfs @ 12.09 hrs, Volume= 205 cf
Outflow = 0.00 cfs @ 10.80 hrs, Volume= 204 cf, Atten= 94%, Lag= 0.0 min
Discarded = 0.00 cfs @ 10.80 hrs, Volume= 204 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 100.14' @ 13.58 hrs Surf.Area= 132 sf Storage= 83 cf

Plug-Flow detention time= 175.6 min calculated for 204 cf (100% of inflow)
Center-of-Mass det. time= 174.7 min (924.1 - 749.4)

Volume	Invert	Avail.Storage	Storage Description
#1	98.80'	96 cf	**Stone Area (Prismatic)**Listed below x 2 264 cf Overall - 24 cf Embedded = 240 cf x 40.0% Voids
#2	99.30'	24 cf	**Infiltrator Quick 4 - 4 units**Listed below x 2 Inside #1
		120 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.80	66	0	0
100.80	66	132	132

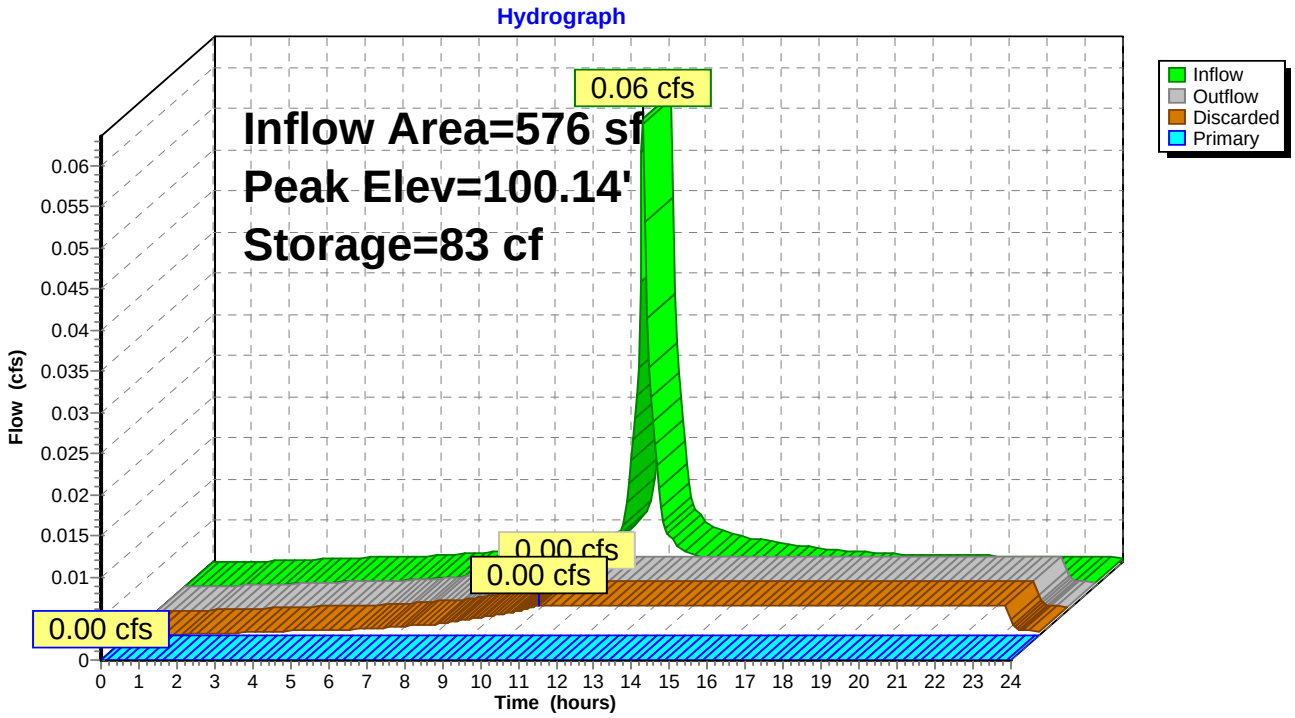
Elevation (feet)	Cum.Store (cubic-feet)
99.30	0
99.47	2
99.63	4
99.80	6
99.97	8
100.13	10
100.30	12

Device	Routing	Invert	Outlet Devices
#1	Primary	100.60'	**4.0" Vert. Downspout Overflow** C= 0.600
#2	Discarded	98.80'	**1.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 10.80 hrs HW=98.82' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=98.80' (Free Discharge)
└─**1=Downspout Overflow** (Controls 0.00 cfs)

Pond 1P: Roof Infiltrator



Summary for Pond 2P: Hse Infiltrator

Inflow Area =	1,170 sf,100.00% Impervious,	Inflow Depth >	4.26"	for 10-Year event	
Inflow =	0.12 cfs @	12.09 hrs,	Volume=	415 cf	
Outflow =	0.03 cfs @	12.50 hrs,	Volume=	371 cf,	Atten= 78%, Lag= 25.1 min
Discarded =	0.01 cfs @	10.05 hrs,	Volume=	337 cf	
Primary =	0.02 cfs @	12.50 hrs,	Volume=	34 cf	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 101.30' @ 12.50 hrs Surf.Area= 198 sf Storage= 164 cf

Plug-Flow detention time= 207.7 min calculated for 370 cf (89% of inflow)
Center-of-Mass det. time= 156.1 min (905.5 - 749.4)

Volume	Invert	Avail.Storage	Storage Description
#1	99.50'	144 cf	**Stone Area (Prismatic)**Listed below x 3 396 cf Overall - 36 cf Embedded = 360 cf x 40.0% Voids
#2	100.00'	36 cf	**Infiltrator Quick 4 - 6 units**Listed below x 3 Inside #1
		180 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.50	66	0	0
101.50	66	132	132

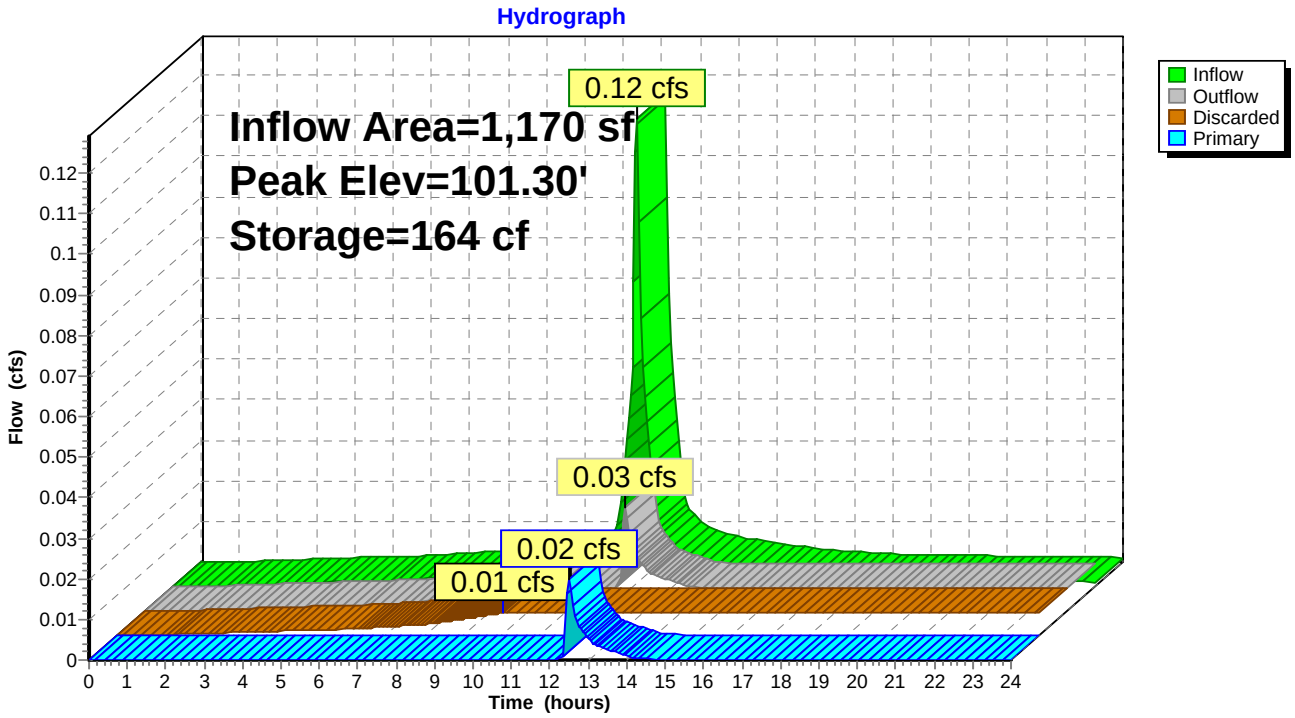
Elevation (feet)	Cum.Store (cubic-feet)
100.00	0
100.17	2
100.33	4
100.50	6
100.67	8
100.83	10
101.00	12

Device	Routing	Invert	Outlet Devices
#1	Primary	101.23'	**3.0" Vert. Downspout Overflow X 2.00** C= 0.600
#2	Discarded	99.50'	**1.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 10.05 hrs HW=99.52' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.02 cfs @ 12.50 hrs HW=101.30' (Free Discharge)
└─**1=Downspout Overflow** (Orifice Controls 0.02 cfs @ 0.89 fps)

Pond 2P: Hse Infiltrator



Summary for Pond 3P: Hse Infiltrator

Inflow Area =	390 sf,100.00% Impervious,	Inflow Depth >	4.26"	for 10-Year event	
Inflow =	0.04 cfs @	12.09 hrs,	Volume=	138 cf	
Outflow =	0.01 cfs @	12.47 hrs,	Volume=	124 cf,	Atten= 72%, Lag= 22.8 min
Discarded =	0.00 cfs @	10.05 hrs,	Volume=	112 cf	
Primary =	0.01 cfs @	12.47 hrs,	Volume=	11 cf	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 100.28' @ 12.47 hrs Surf.Area= 66 sf Storage= 54 cf

Plug-Flow detention time= 207.6 min calculated for 124 cf (89% of inflow)
Center-of-Mass det. time= 155.7 min (905.1 - 749.4)

Volume	Invert	Avail.Storage	Storage Description
#1	98.50'	48 cf	**Stone Area (Prismatic)**Listed below 132 cf Overall - 12 cf Embedded = 120 cf x 40.0% Voids
#2	99.00'	12 cf	**Infiltrator Quick 4 - 2 units**Listed below Inside #1
		60 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.50	66	0	0
100.50	66	132	132

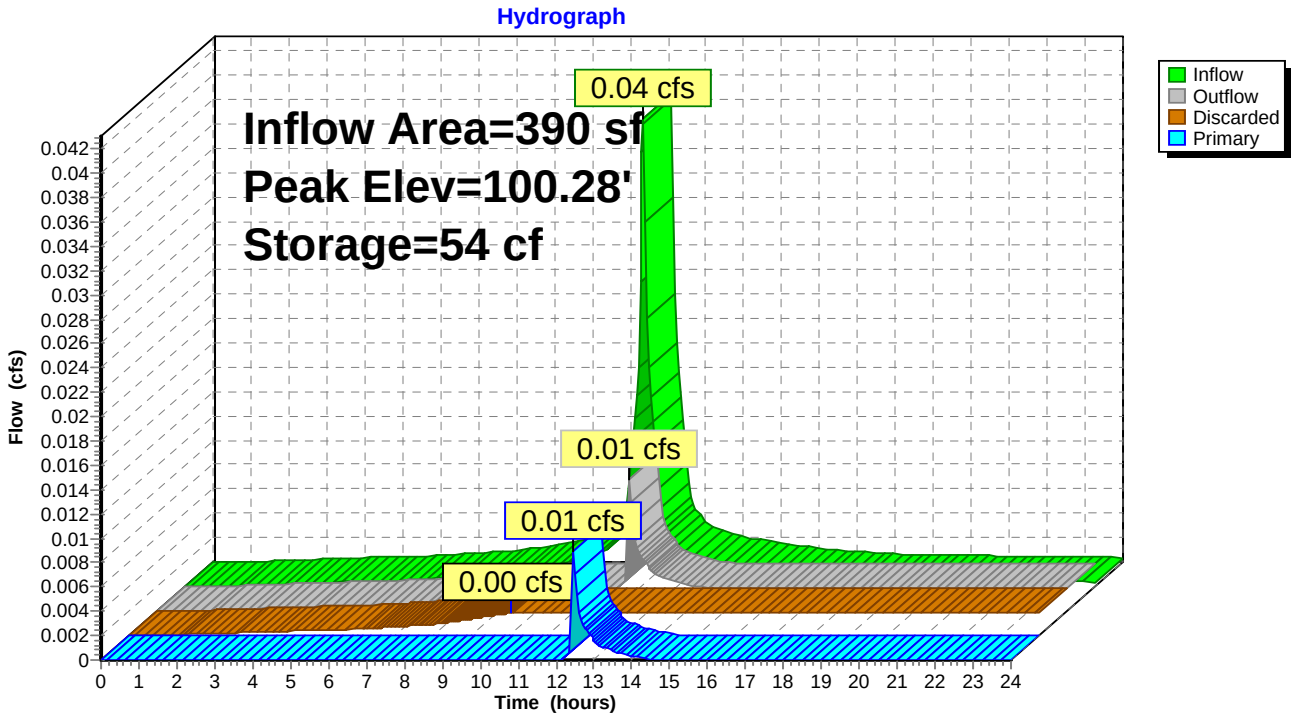
Elevation (feet)	Cum.Store (cubic-feet)
99.00	0
99.17	2
99.33	4
99.50	6
99.67	8
99.83	10
100.00	12

Device	Routing	Invert	Outlet Devices
#1	Primary	100.23'	**3.0" Vert. Downspout Overflow X 2.00** C= 0.600
#2	Discarded	98.50'	**1.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 10.05 hrs HW=98.52' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.01 cfs @ 12.47 hrs HW=100.27' (Free Discharge)
└─**1=Downspout Overflow** (Orifice Controls 0.01 cfs @ 0.70 fps)

Pond 3P: Hse Infiltrator

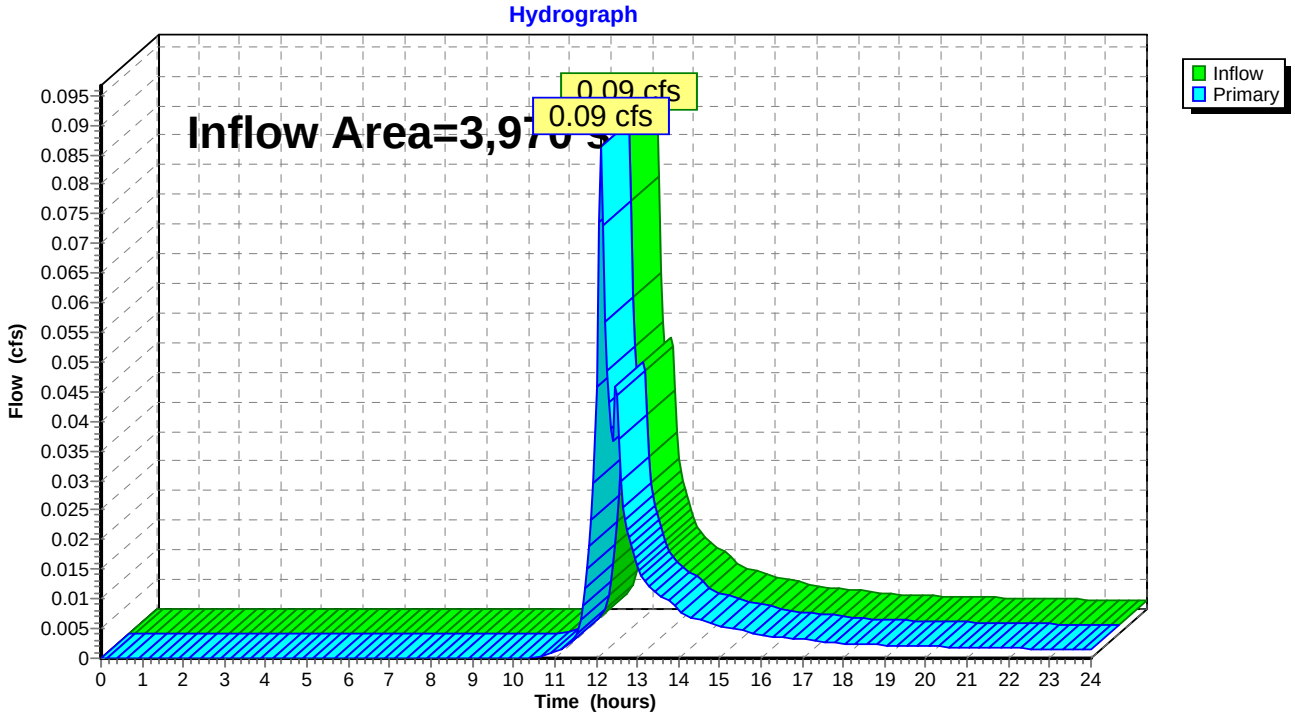


Summary for Link 2L: Post to Northeast

Inflow Area = 3,970 sf, 43.98% Impervious, Inflow Depth > 0.96" for 10-Year event
Inflow = 0.09 cfs @ 12.10 hrs, Volume= 317 cf
Primary = 0.09 cfs @ 12.10 hrs, Volume= 317 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: Post to Northeast

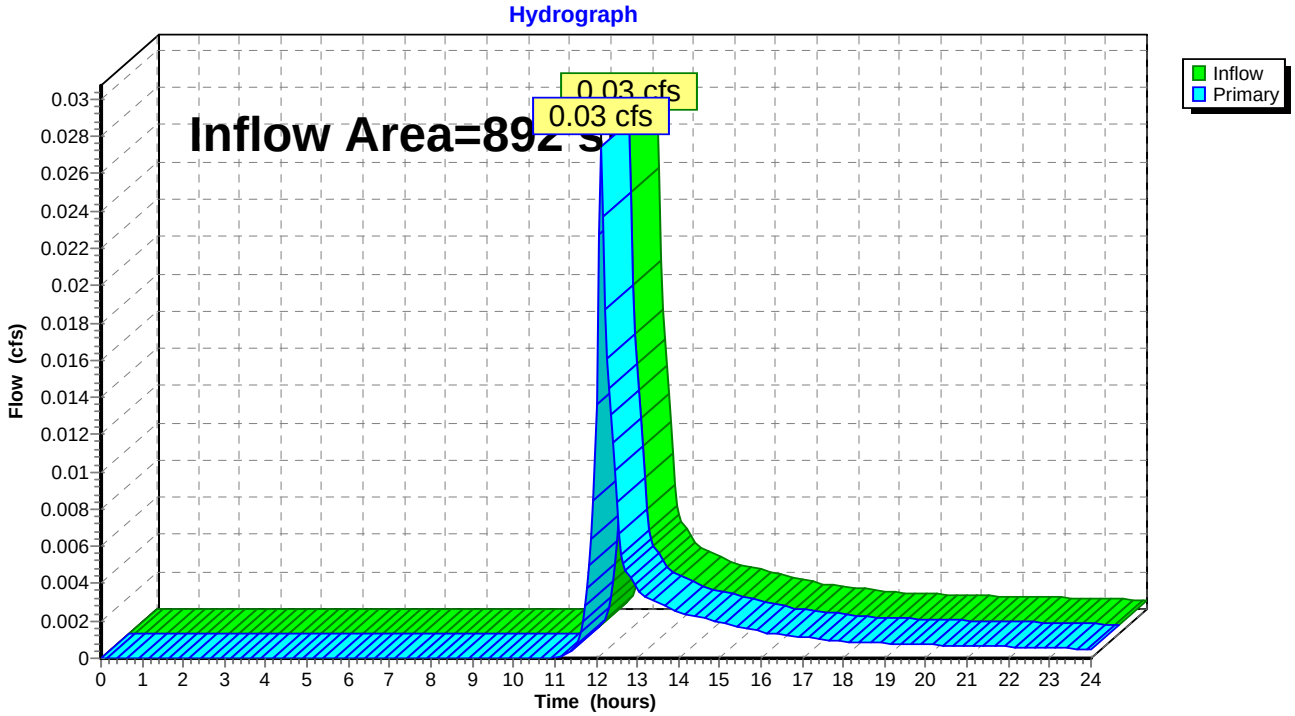


Summary for Link 3L: Post to North

Inflow Area = 892 sf, 5.04% Impervious, Inflow Depth > 1.26" for 10-Year event
Inflow = 0.03 cfs @ 12.10 hrs, Volume= 94 cf
Primary = 0.03 cfs @ 12.10 hrs, Volume= 94 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 3L: Post to North

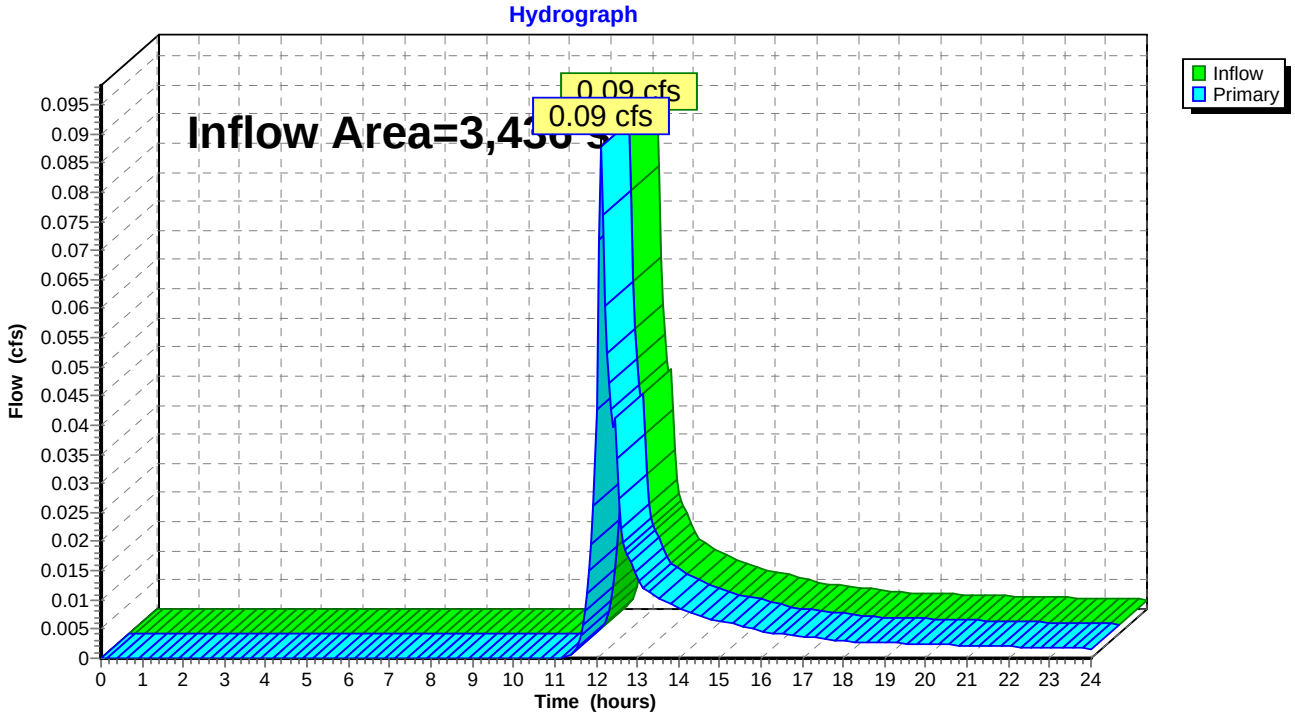


Summary for Link 4L: Post to Northwest

Inflow Area = 3,436 sf, 11.35% Impervious, Inflow Depth > 1.10" for 10-Year event
Inflow = 0.09 cfs @ 12.10 hrs, Volume= 316 cf
Primary = 0.09 cfs @ 12.10 hrs, Volume= 316 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: Post to Northwest

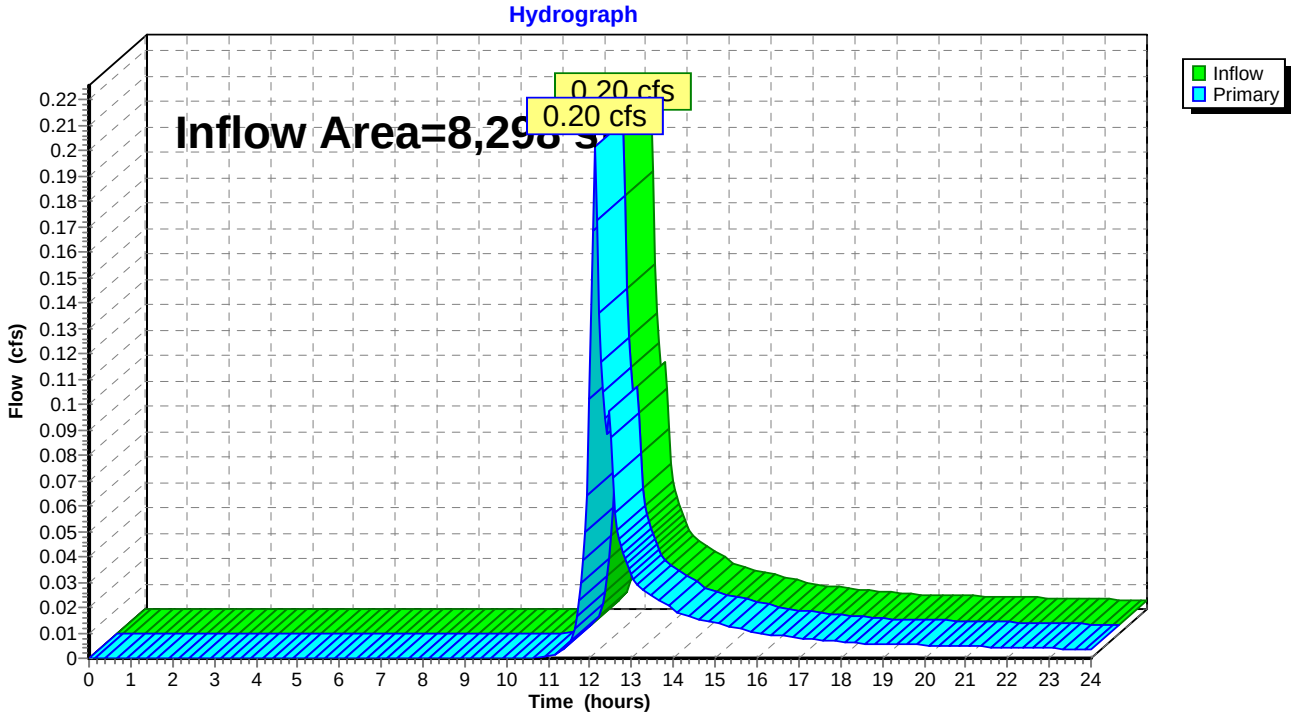


Summary for Link 11L: Total Site Post

Inflow Area = 8,298 sf, 26.28% Impervious, Inflow Depth > 1.05" for 10-Year event
Inflow = 0.20 cfs @ 12.10 hrs, Volume= 727 cf
Primary = 0.20 cfs @ 12.10 hrs, Volume= 727 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 11L: Total Site Post



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 4S: Post to Northeast Runoff Area=2,224 sf 0.00% Impervious Runoff Depth>3.01"
Tc=6.0 min CN=68 Runoff=0.18 cfs 557 cf

Subcatchment 5S: Post to North Runoff Area=892 sf 5.04% Impervious Runoff Depth>2.62"
Tc=6.0 min UI Adjusted CN=64 Runoff=0.06 cfs 195 cf

Subcatchment 6S: Post to Northwest Runoff Area=3,046 sf 0.00% Impervious Runoff Depth>2.53"
Tc=6.0 min CN=63 Runoff=0.20 cfs 642 cf

Subcatchment 7S: Garage Runoff Area=576 sf 100.00% Impervious Runoff Depth>6.26"
Tc=6.0 min CN=98 Runoff=0.08 cfs 300 cf

Subcatchment 8S: House Runoff Area=390 sf 100.00% Impervious Runoff Depth>6.26"
Tc=6.0 min CN=98 Runoff=0.06 cfs 203 cf

Subcatchment 9S: House Runoff Area=1,170 sf 100.00% Impervious Runoff Depth>6.26"
Tc=6.0 min CN=98 Runoff=0.17 cfs 610 cf

Pond 1P: Roof Infiltrator Peak Elev=100.69' Storage=114 cf Inflow=0.08 cfs 300 cf
Discarded=0.00 cfs 231 cf Primary=0.02 cfs 33 cf Outflow=0.02 cfs 264 cf

Pond 2P: Hse Infiltrator Peak Elev=101.45' Storage=176 cf Inflow=0.17 cfs 610 cf
Discarded=0.01 cfs 366 cf Primary=0.15 cfs 172 cf Outflow=0.15 cfs 537 cf

Pond 3P: Hse Infiltrator Peak Elev=100.35' Storage=56 cf Inflow=0.06 cfs 203 cf
Discarded=0.00 cfs 122 cf Primary=0.06 cfs 57 cf Outflow=0.06 cfs 179 cf

Link 2L: Post to Northeast Inflow=0.29 cfs 762 cf
Primary=0.29 cfs 762 cf

Link 3L: Post to North Inflow=0.06 cfs 195 cf
Primary=0.06 cfs 195 cf

Link 4L: Post to Northwest Inflow=0.23 cfs 699 cf
Primary=0.23 cfs 699 cf

Link 11L: Total Site Post Inflow=0.57 cfs 1,656 cf
Primary=0.57 cfs 1,656 cf

Total Runoff Area = 8,298 sf Runoff Volume = 2,508 cf Average Runoff Depth = 3.63"
73.72% Pervious = 6,117 sf 26.28% Impervious = 2,181 sf

Summary for Subcatchment 4S: Post to Northeast

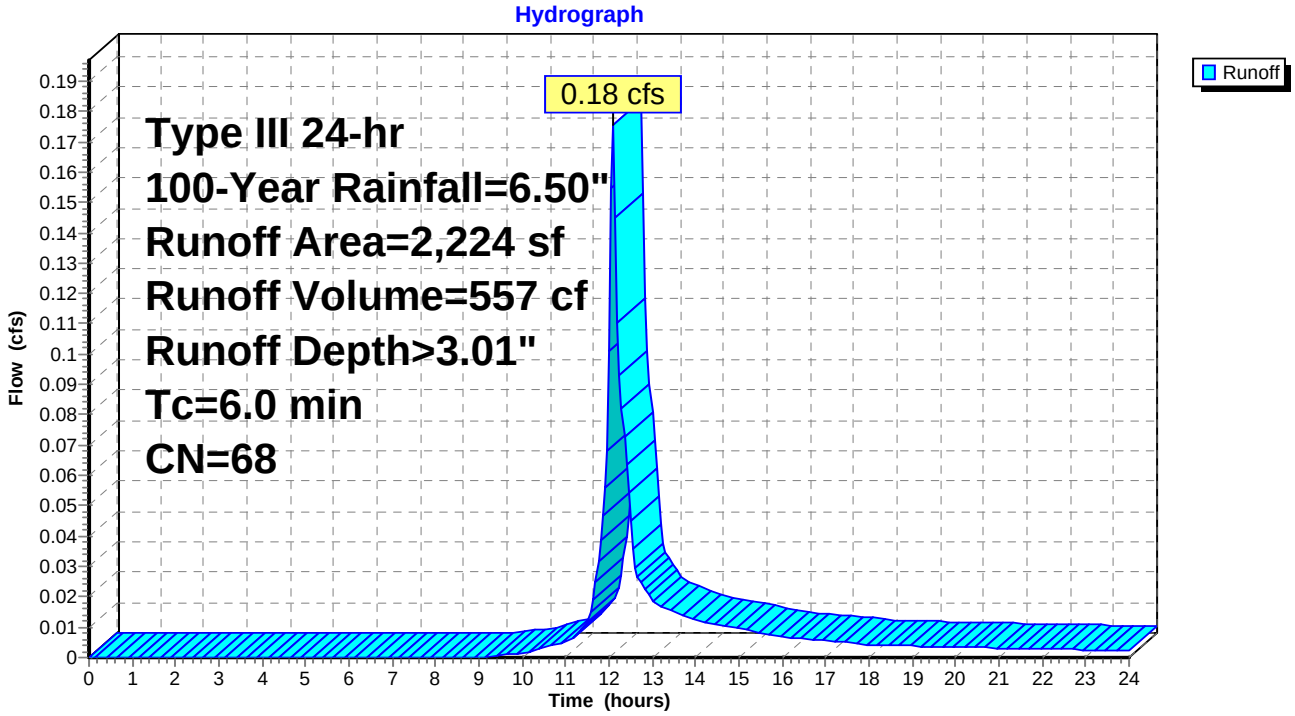
Runoff = 0.18 cfs @ 12.10 hrs, Volume= 557 cf, Depth> 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

	Area (sf)	CN	Description
	1,410	61	>75% Grass cover, Good, HSG B
*	814	80	Unconnected pavement, HSG B
	2,224	68	Weighted Average
	2,224		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 4S: Post to Northeast



Summary for Subcatchment 5S: Post to North

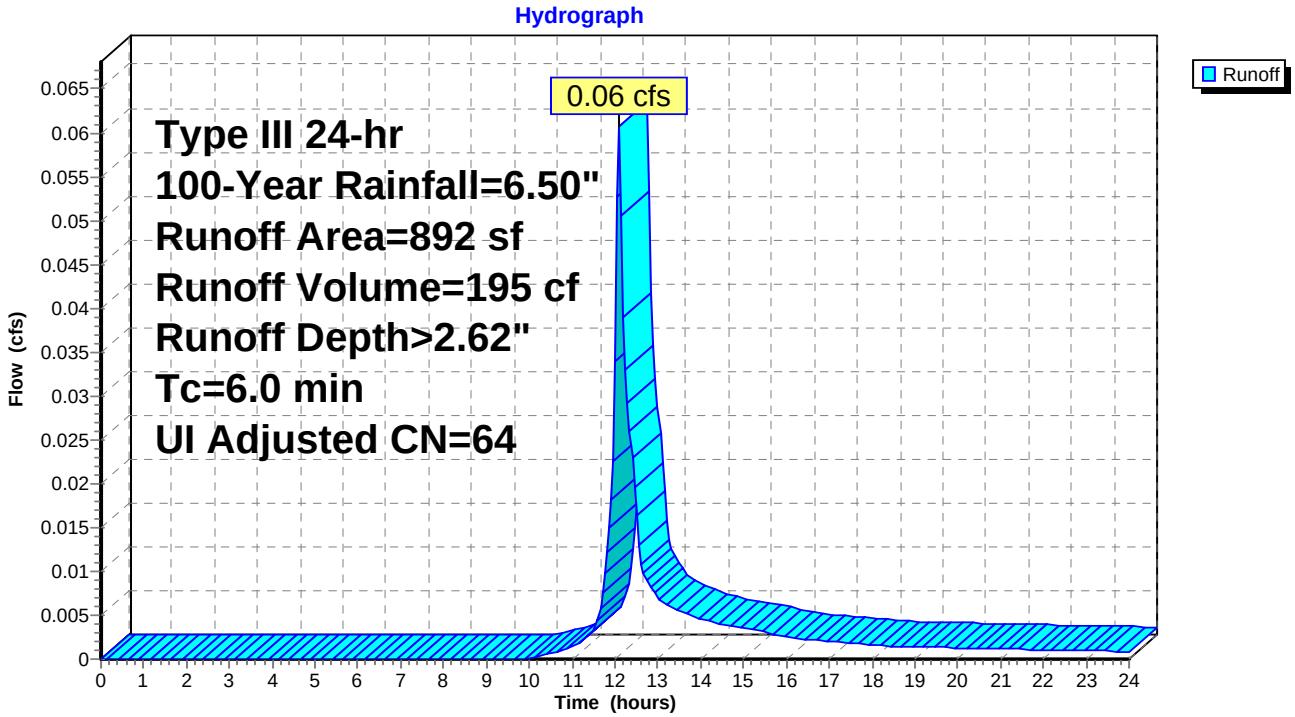
Runoff = 0.06 cfs @ 12.10 hrs, Volume= 195 cf, Depth> 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

	Area (sf)	CN	Adj	Description
	756	61		>75% Grass cover, Good, HSG B
*	91	80		Unconnected pavement, HSG B
	45	98		Unconnected pavement, HSG B
	892	65	64	Weighted Average, UI Adjusted
	847			94.96% Pervious Area
	45			5.04% Impervious Area
	45			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 5S: Post to North



Summary for Subcatchment 6S: Post to Northwest

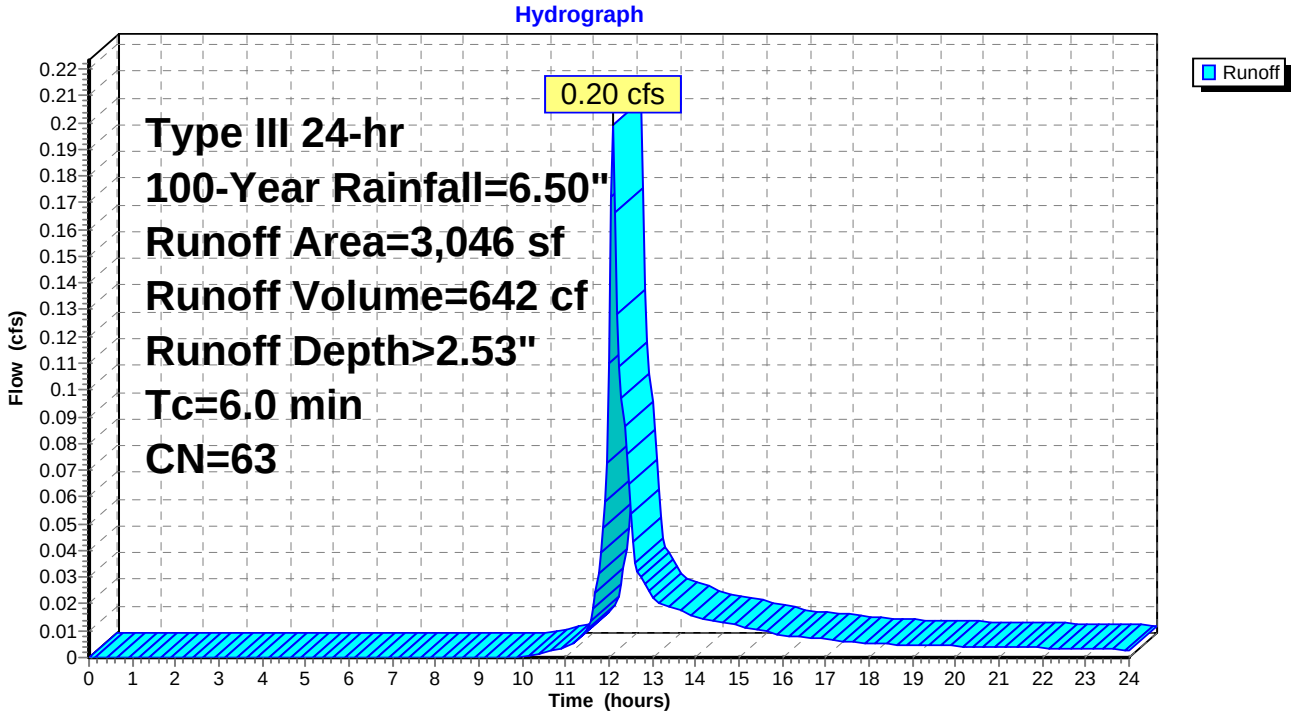
Runoff = 0.20 cfs @ 12.10 hrs, Volume= 642 cf, Depth> 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

	Area (sf)	CN	Description
	2,747	61	>75% Grass cover, Good, HSG B
*	299	80	Unconnected pavement, HSG B
	3,046	63	Weighted Average
	3,046		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 6S: Post to Northwest



Summary for Subcatchment 7S: Garage

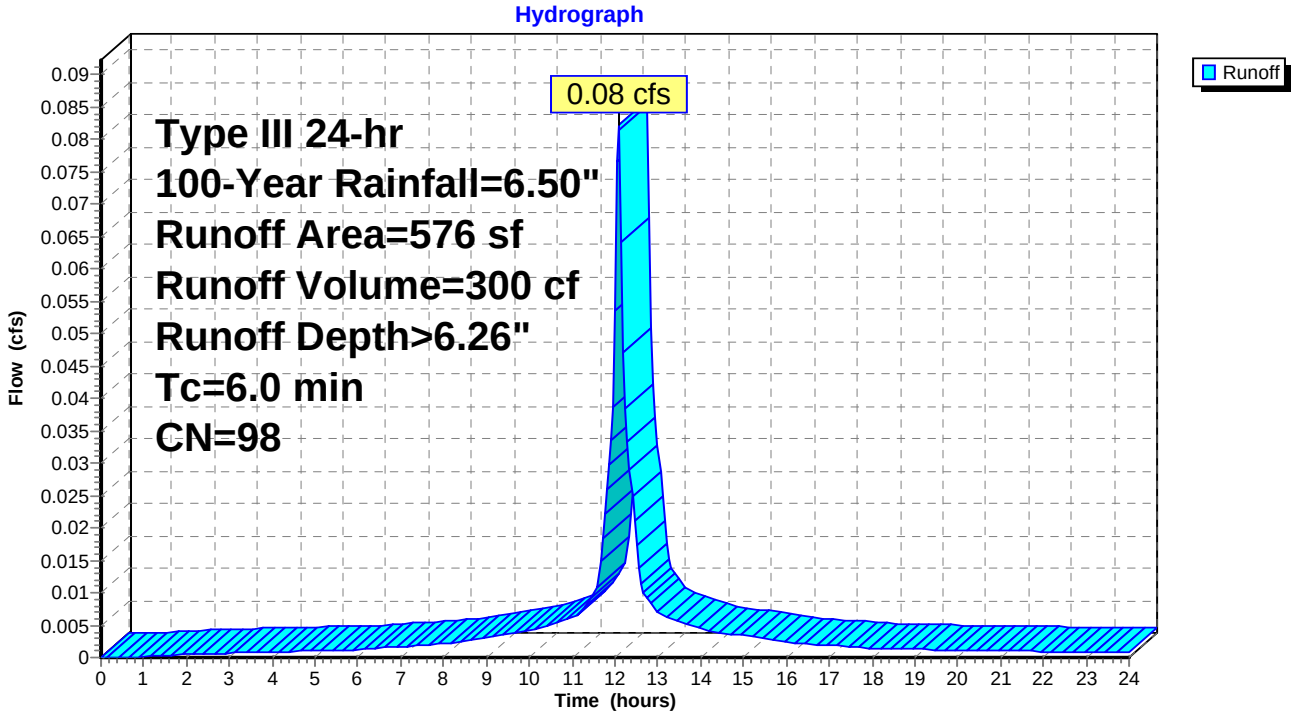
Runoff = 0.08 cfs @ 12.09 hrs, Volume= 300 cf, Depth> 6.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
576	98	Roofs, HSG B
576		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 7S: Garage



Summary for Subcatchment 8S: House

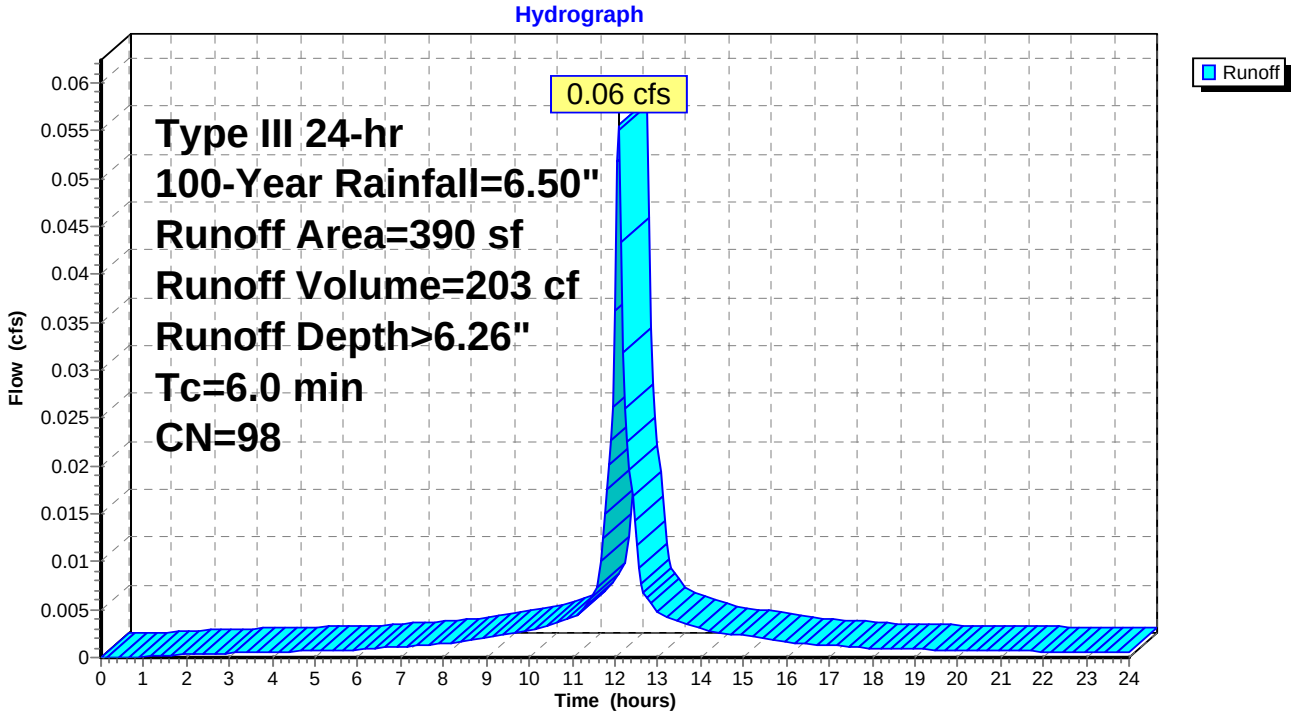
Runoff = 0.06 cfs @ 12.09 hrs, Volume= 203 cf, Depth> 6.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
390	98	Roofs, HSG B
390		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 8S: House



Summary for Subcatchment 9S: House

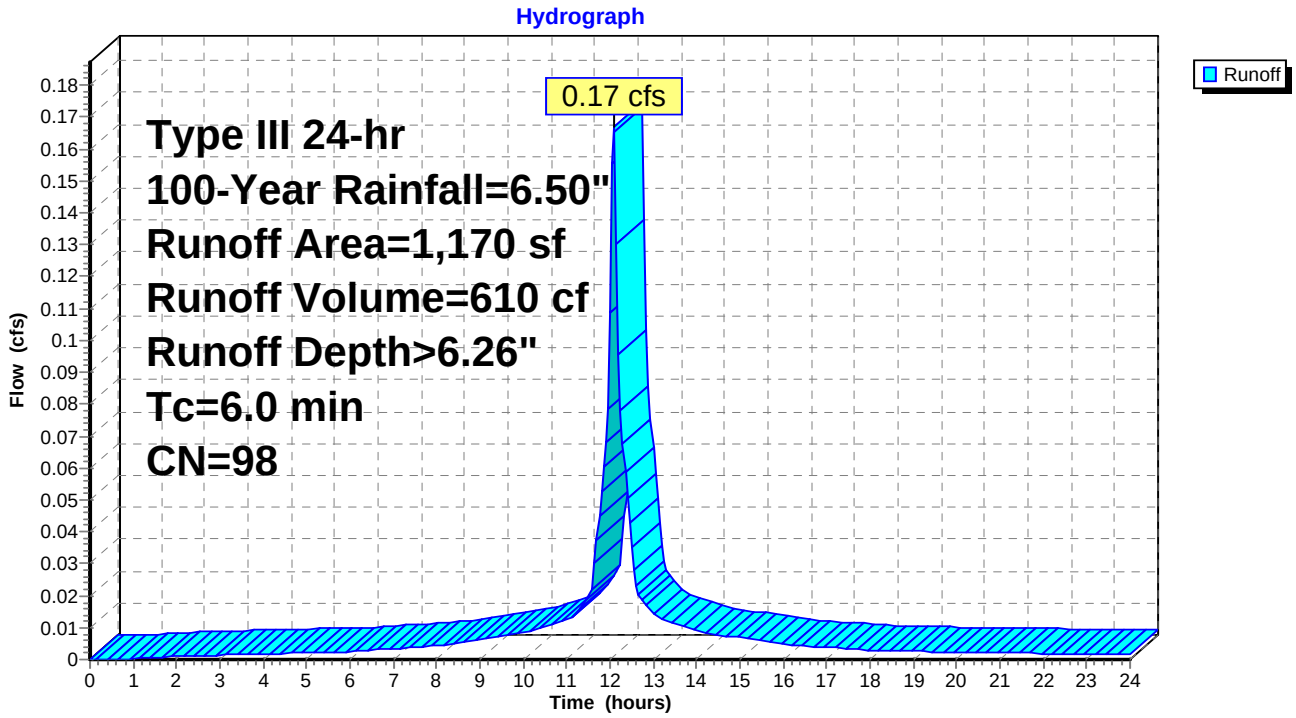
Runoff = 0.17 cfs @ 12.09 hrs, Volume= 610 cf, Depth> 6.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,170	98	Roofs, HSG B
1,170		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, min tc**

Subcatchment 9S: House



Summary for Pond 1P: Roof Infiltrator

Inflow Area =	576 sf,100.00% Impervious,	Inflow Depth >	6.26"	for 100-Year event	
Inflow =	0.08 cfs @	12.09 hrs,	Volume=	300 cf	
Outflow =	0.02 cfs @	12.42 hrs,	Volume=	264 cf,	Atten= 70%, Lag= 20.3 min
Discarded =	0.00 cfs @	9.70 hrs,	Volume=	231 cf	
Primary =	0.02 cfs @	12.42 hrs,	Volume=	33 cf	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 100.69' @ 12.42 hrs Surf.Area= 132 sf Storage= 114 cf

Plug-Flow detention time= 200.2 min calculated for 263 cf (88% of inflow)
Center-of-Mass det. time= 143.5 min (887.1 - 743.6)

Volume	Invert	Avail.Storage	Storage Description
#1	98.80'	96 cf	**Stone Area (Prismatic)**Listed below x 2 264 cf Overall - 24 cf Embedded = 240 cf x 40.0% Voids
#2	99.30'	24 cf	**Infiltrator Quick 4 - 4 units**Listed below x 2 Inside #1
		120 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.80	66	0	0
100.80	66	132	132

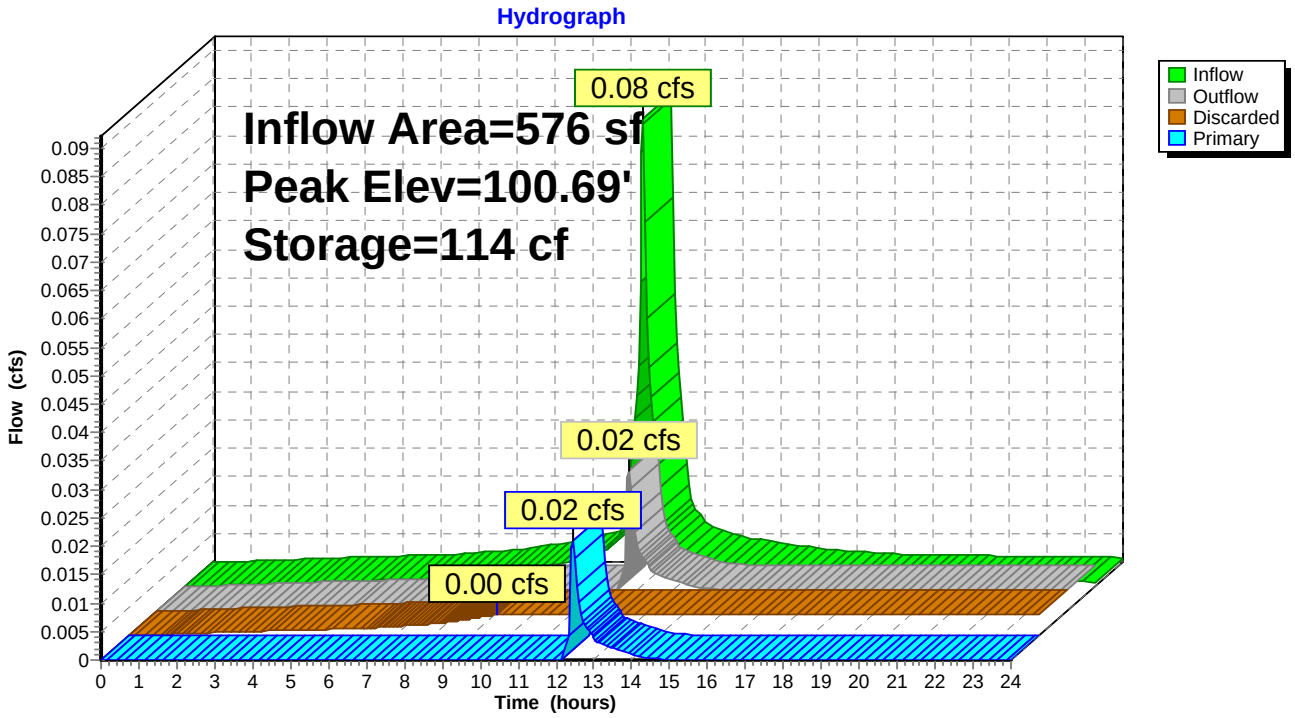
Elevation (feet)	Cum.Store (cubic-feet)
99.30	0
99.47	2
99.63	4
99.80	6
99.97	8
100.13	10
100.30	12

Device	Routing	Invert	Outlet Devices
#1	Primary	100.60'	**4.0" Vert. Downspout Overflow** C= 0.600
#2	Discarded	98.80'	**1.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 9.70 hrs HW=98.82' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.02 cfs @ 12.42 hrs HW=100.69' (Free Discharge)
└─**1=Downspout Overflow** (Orifice Controls 0.02 cfs @ 1.02 fps)

Pond 1P: Roof Infiltrator



Summary for Pond 2P: Hse Infiltrator

Inflow Area =	1,170 sf,100.00% Impervious,	Inflow Depth >	6.26"	for 100-Year event	
Inflow =	0.17 cfs @	12.09 hrs,	Volume=	610 cf	
Outflow =	0.15 cfs @	12.16 hrs,	Volume=	537 cf,	Atten= 9%, Lag= 4.5 min
Discarded =	0.01 cfs @	8.75 hrs,	Volume=	366 cf	
Primary =	0.15 cfs @	12.16 hrs,	Volume=	172 cf	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 101.45' @ 12.16 hrs Surf.Area= 198 sf Storage= 176 cf

Plug-Flow detention time= 151.1 min calculated for 536 cf (88% of inflow)
Center-of-Mass det. time= 95.3 min (838.9 - 743.6)

Volume	Invert	Avail.Storage	Storage Description
#1	99.50'	144 cf	**Stone Area (Prismatic)**Listed below x 3 396 cf Overall - 36 cf Embedded = 360 cf x 40.0% Voids
#2	100.00'	36 cf	**Infiltrator Quick 4 - 6 units**Listed below x 3 Inside #1
		180 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.50	66	0	0
101.50	66	132	132

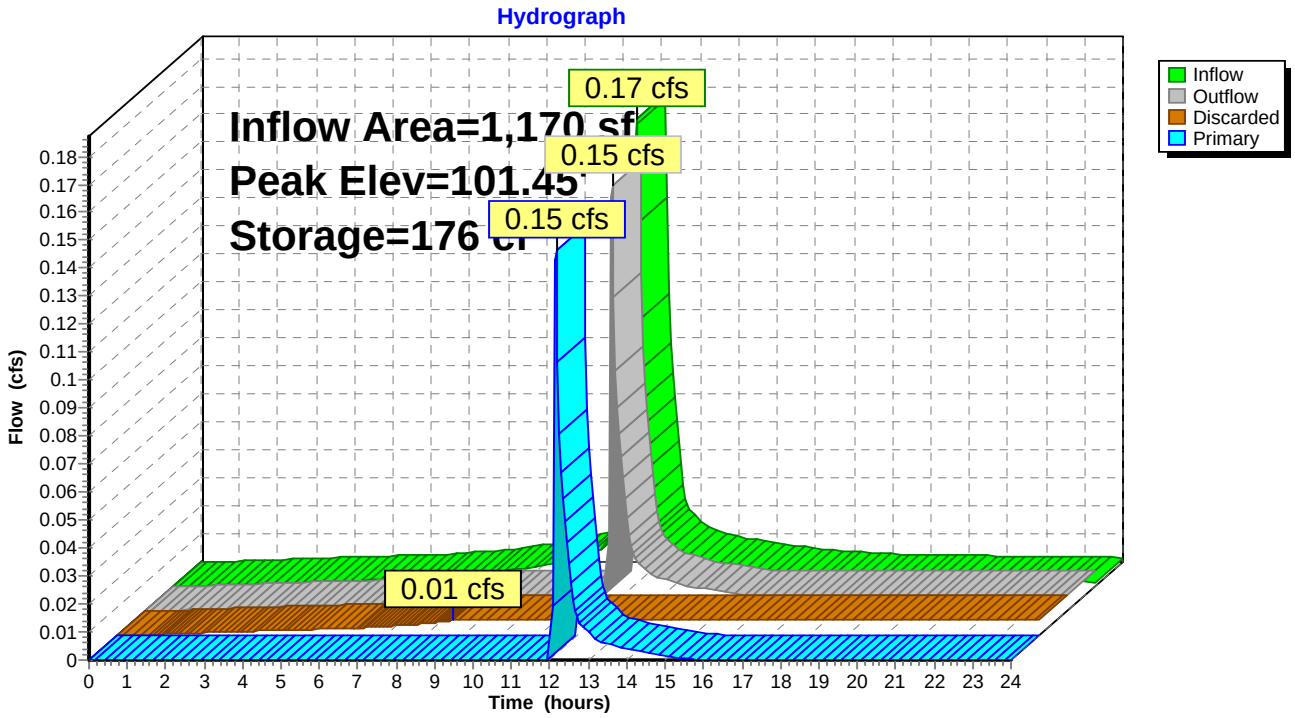
Elevation (feet)	Cum.Store (cubic-feet)
100.00	0
100.17	2
100.33	4
100.50	6
100.67	8
100.83	10
101.00	12

Device	Routing	Invert	Outlet Devices
#1	Primary	101.23'	**3.0" Vert. Downspout Overflow X 2.00** C= 0.600
#2	Discarded	99.50'	**1.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 8.75 hrs HW=99.52' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.13 cfs @ 12.16 hrs HW=101.44' (Free Discharge)
└─**1=Downspout Overflow** (Orifice Controls 0.13 cfs @ 1.55 fps)

Pond 2P: Hse Infiltrator



Summary for Pond 3P: Hse Infiltrator

[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area =	390 sf,100.00% Impervious,	Inflow Depth >	6.26"	for	100-Year event
Inflow =	0.06 cfs @	12.09 hrs,	Volume=	203 cf	
Outflow =	0.06 cfs @	12.15 hrs,	Volume=	179 cf,	Atten= 0%, Lag= 3.9 min
Discarded =	0.00 cfs @	8.75 hrs,	Volume=	122 cf	
Primary =	0.06 cfs @	12.15 hrs,	Volume=	57 cf	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 100.35' @ 12.15 hrs Surf.Area= 66 sf Storage= 56 cf

Plug-Flow detention time= 151.1 min calculated for 179 cf (88% of inflow)
Center-of-Mass det. time= 94.7 min (838.3 - 743.6)

Volume	Invert	Avail.Storage	Storage Description
#1	98.50'	48 cf	**Stone Area (Prismatic)**Listed below 132 cf Overall - 12 cf Embedded = 120 cf x 40.0% Voids
#2	99.00'	12 cf	**Infiltrator Quick 4 - 2 units**Listed below Inside #1
		60 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.50	66	0	0
100.50	66	132	132

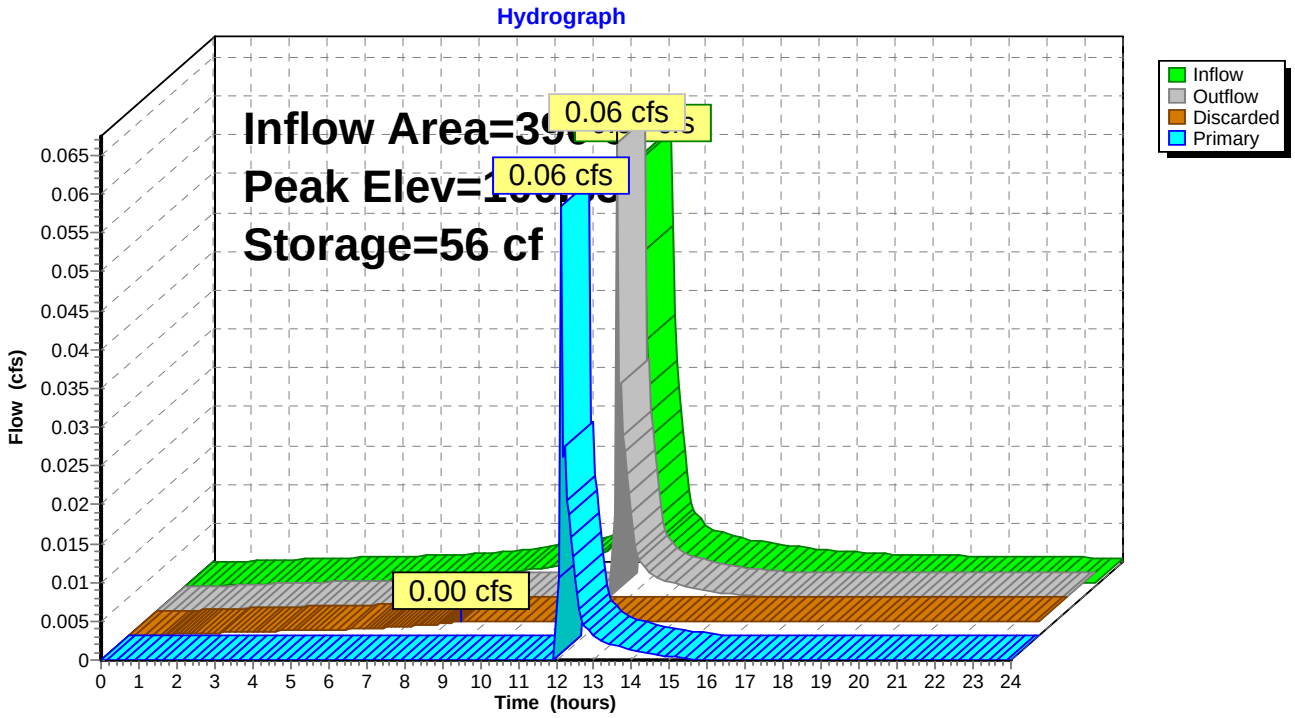
Elevation (feet)	Cum.Store (cubic-feet)
99.00	0
99.17	2
99.33	4
99.50	6
99.67	8
99.83	10
100.00	12

Device	Routing	Invert	Outlet Devices
#1	Primary	100.23'	**3.0" Vert. Downspout Overflow X 2.00** C= 0.600
#2	Discarded	98.50'	**1.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 8.75 hrs HW=98.52' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.06 cfs @ 12.15 hrs HW=100.35' (Free Discharge)
└─**1=Downspout Overflow** (Orifice Controls 0.06 cfs @ 1.19 fps)

Pond 3P: Hse Infiltrator

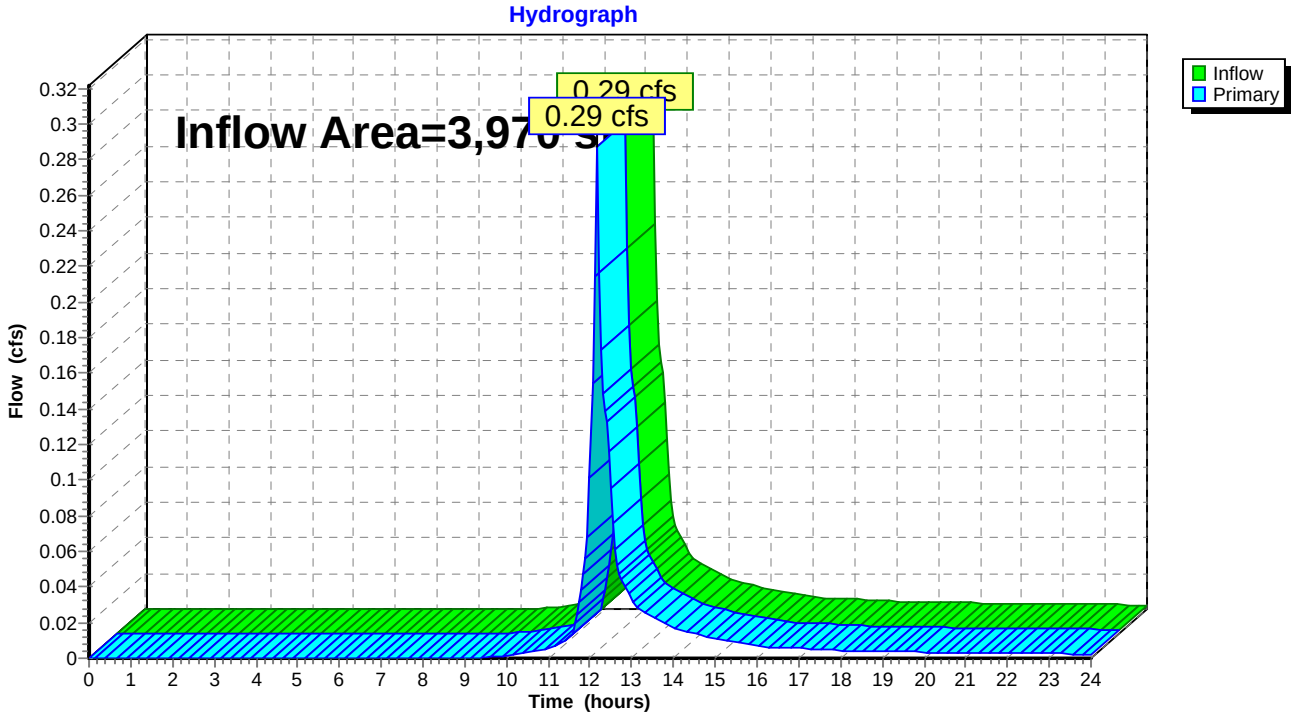


Summary for Link 2L: Post to Northeast

Inflow Area = 3,970 sf, 43.98% Impervious, Inflow Depth > 2.30" for 100-Year event
Inflow = 0.29 cfs @ 12.15 hrs, Volume= 762 cf
Primary = 0.29 cfs @ 12.15 hrs, Volume= 762 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: Post to Northeast

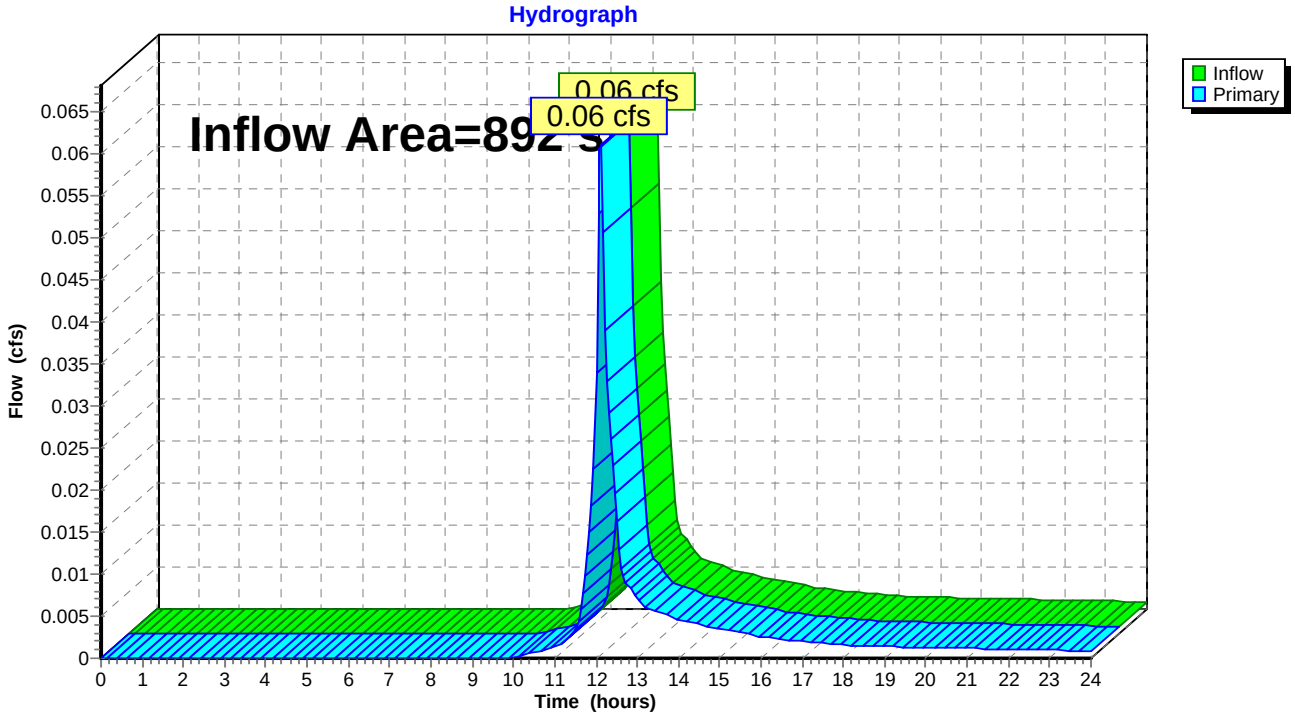


Summary for Link 3L: Post to North

Inflow Area = 892 sf, 5.04% Impervious, Inflow Depth > 2.62" for 100-Year event
Inflow = 0.06 cfs @ 12.10 hrs, Volume= 195 cf
Primary = 0.06 cfs @ 12.10 hrs, Volume= 195 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 3L: Post to North

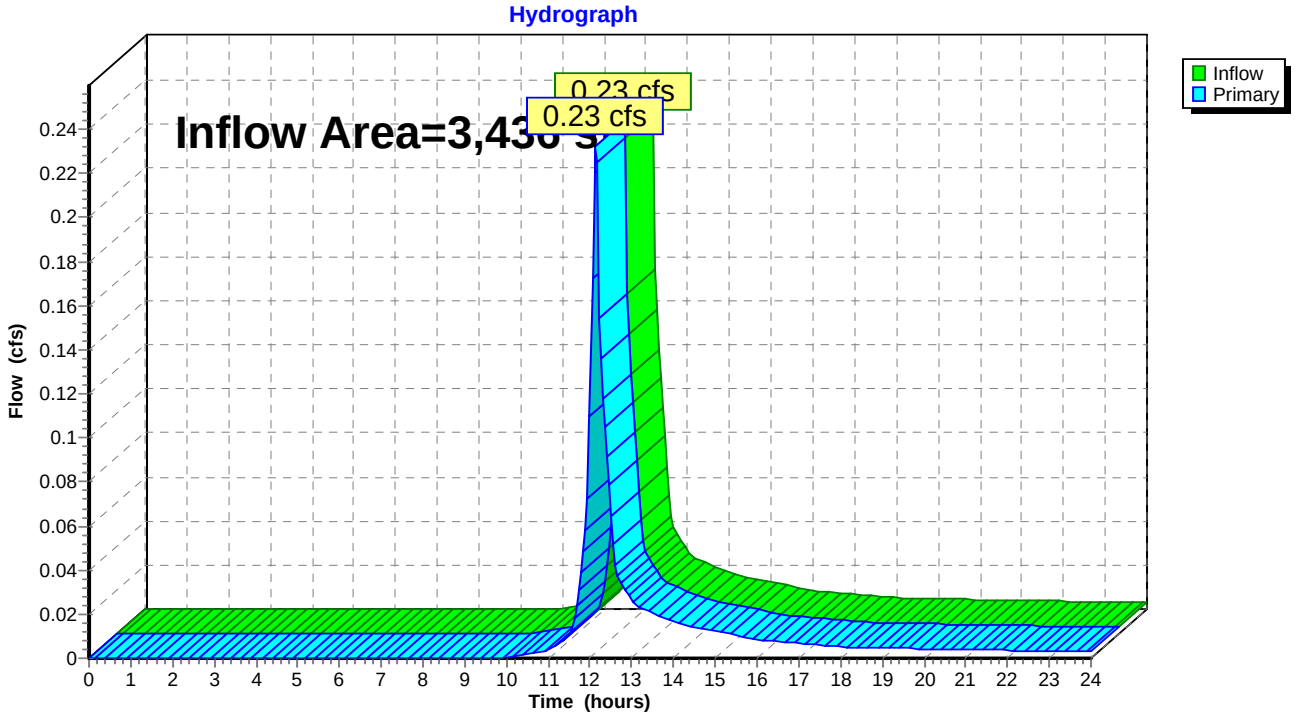


Summary for Link 4L: Post to Northwest

Inflow Area = 3,436 sf, 11.35% Impervious, Inflow Depth > 2.44" for 100-Year event
Inflow = 0.23 cfs @ 12.13 hrs, Volume= 699 cf
Primary = 0.23 cfs @ 12.13 hrs, Volume= 699 cf, Atten= 0%, Lag= 0.0 min

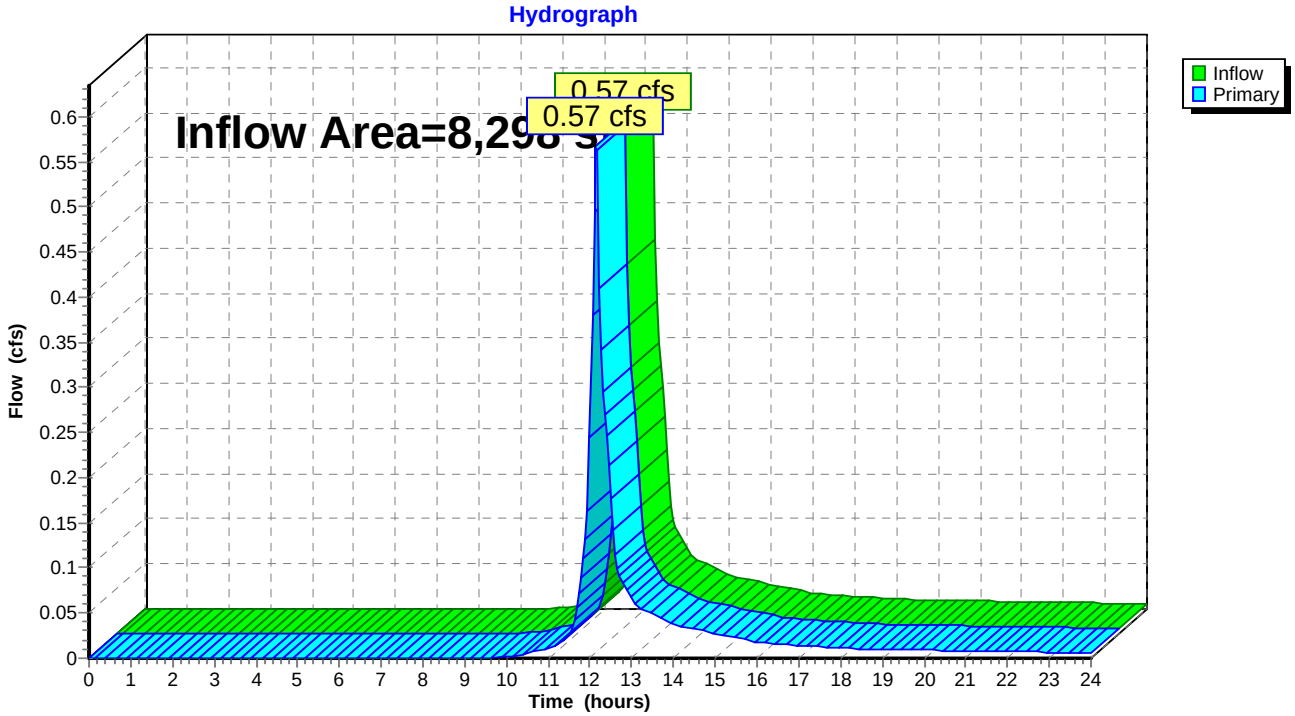
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: Post to Northwest



Summary for Link 11L: Total Site Post

Inflow Area = 8,298 sf, 26.28% Impervious, Inflow Depth > 2.39" for 100-Year event
Inflow = 0.57 cfs @ 12.14 hrs, Volume= 1,656 cf
Primary = 0.57 cfs @ 12.14 hrs, Volume= 1,656 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 11L: Total Site Post